

May 23, 1950

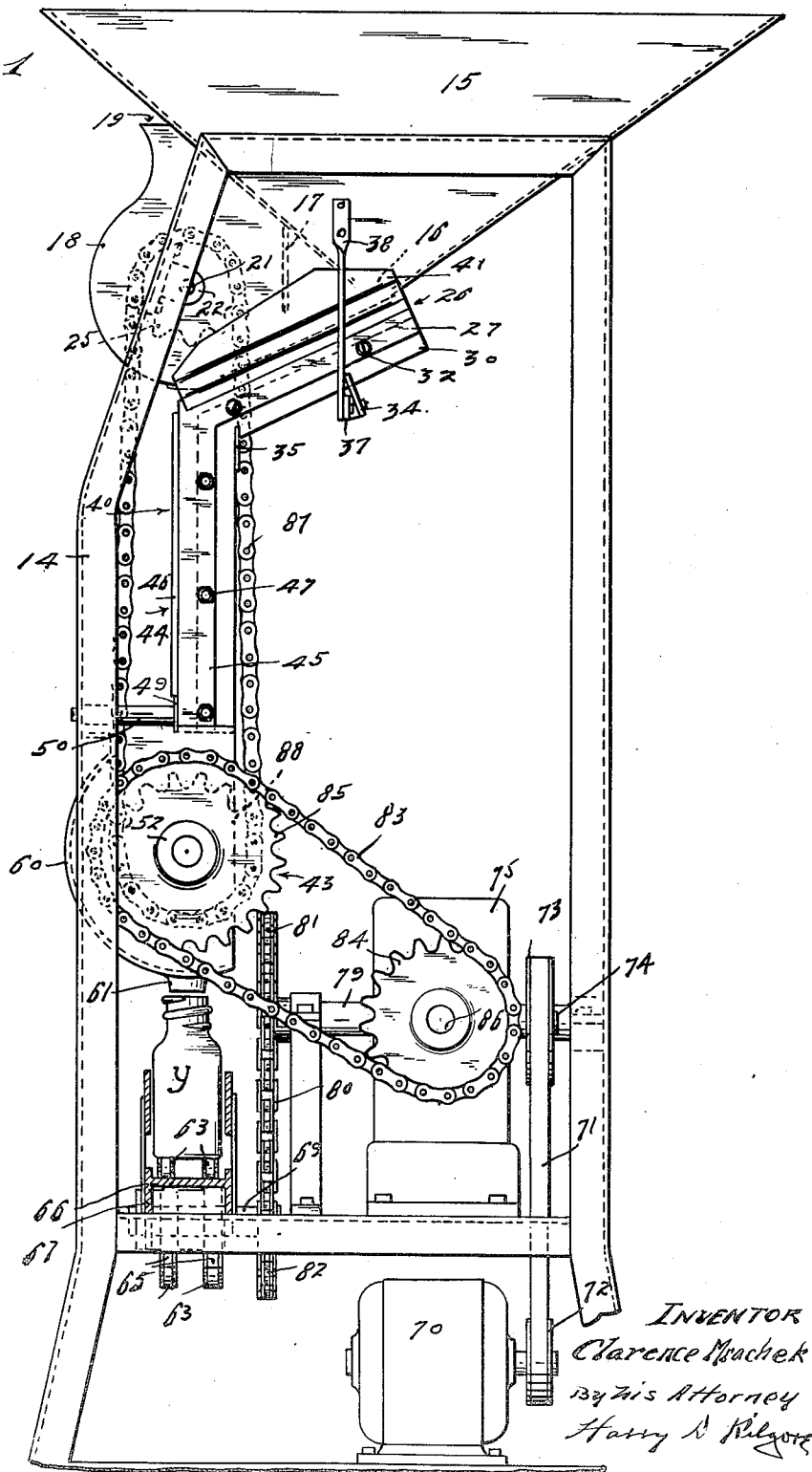
C. MRACHEK
MACHINE FOR SORTING, COUNTING, AND
PACKAGING MEDICINAL TABLETS

2,509,069

Filed Oct. 4, 1945

5 Sheets-Sheet 1

Fig. 1



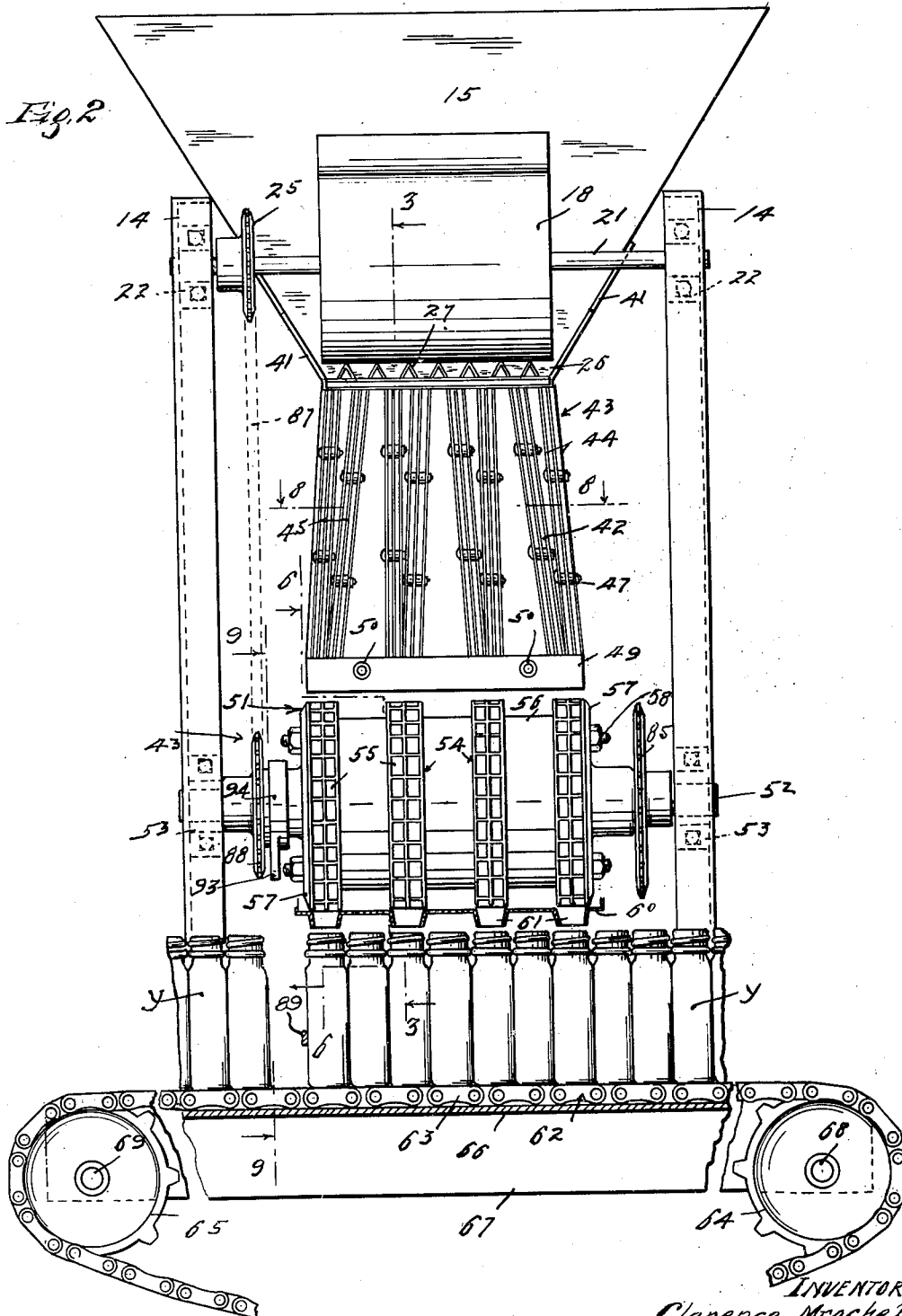
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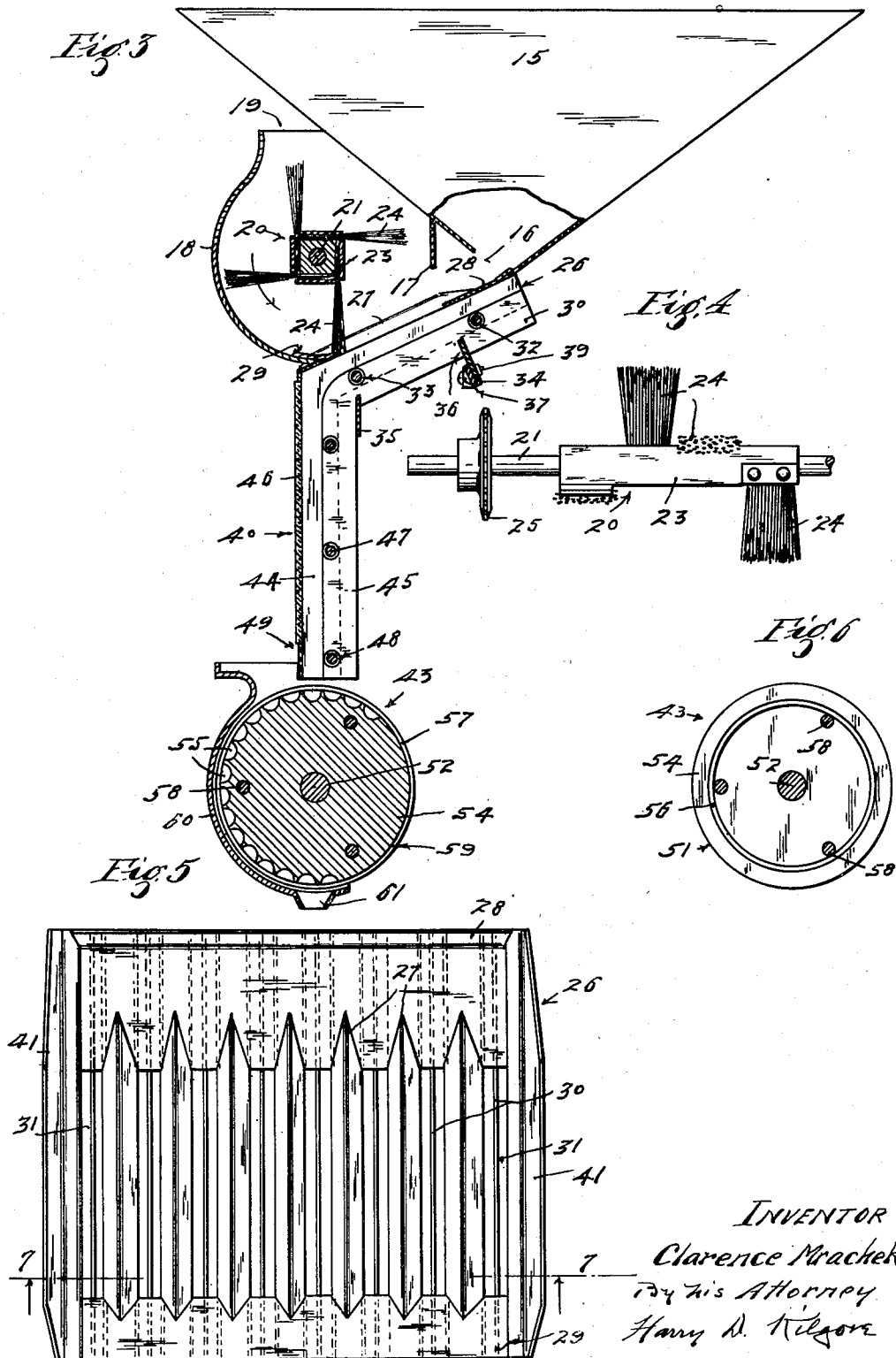
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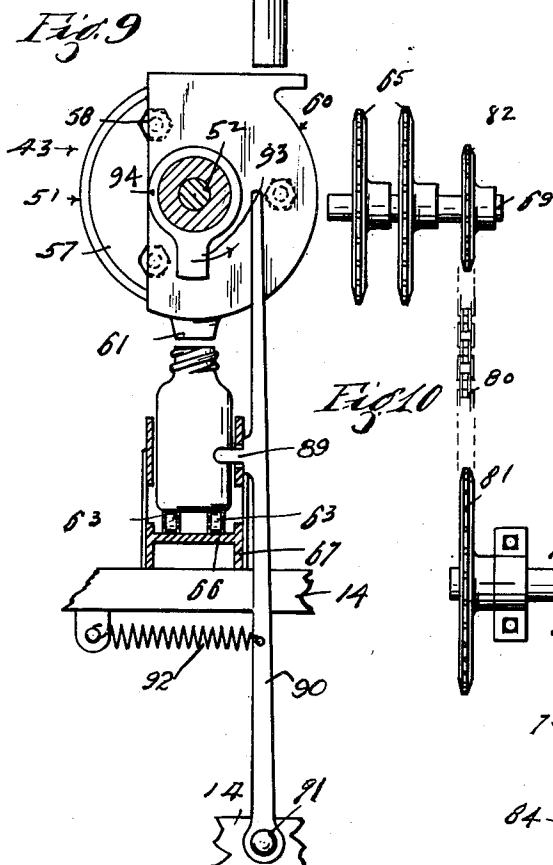
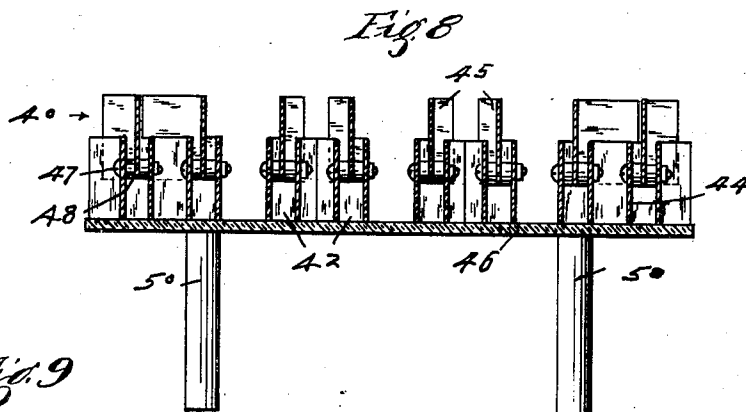
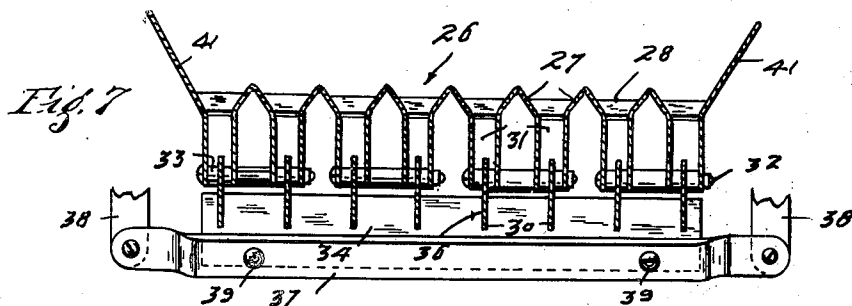
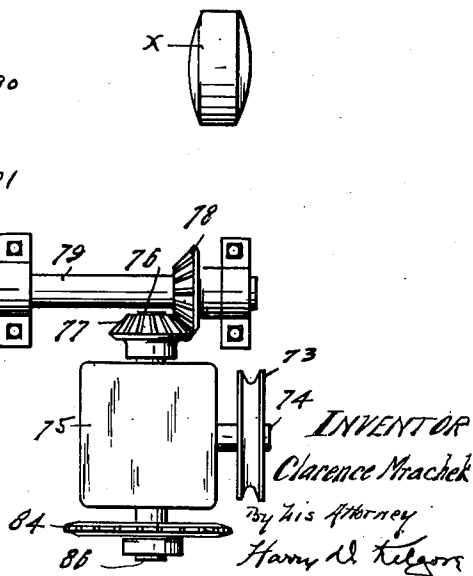


Fig. 11



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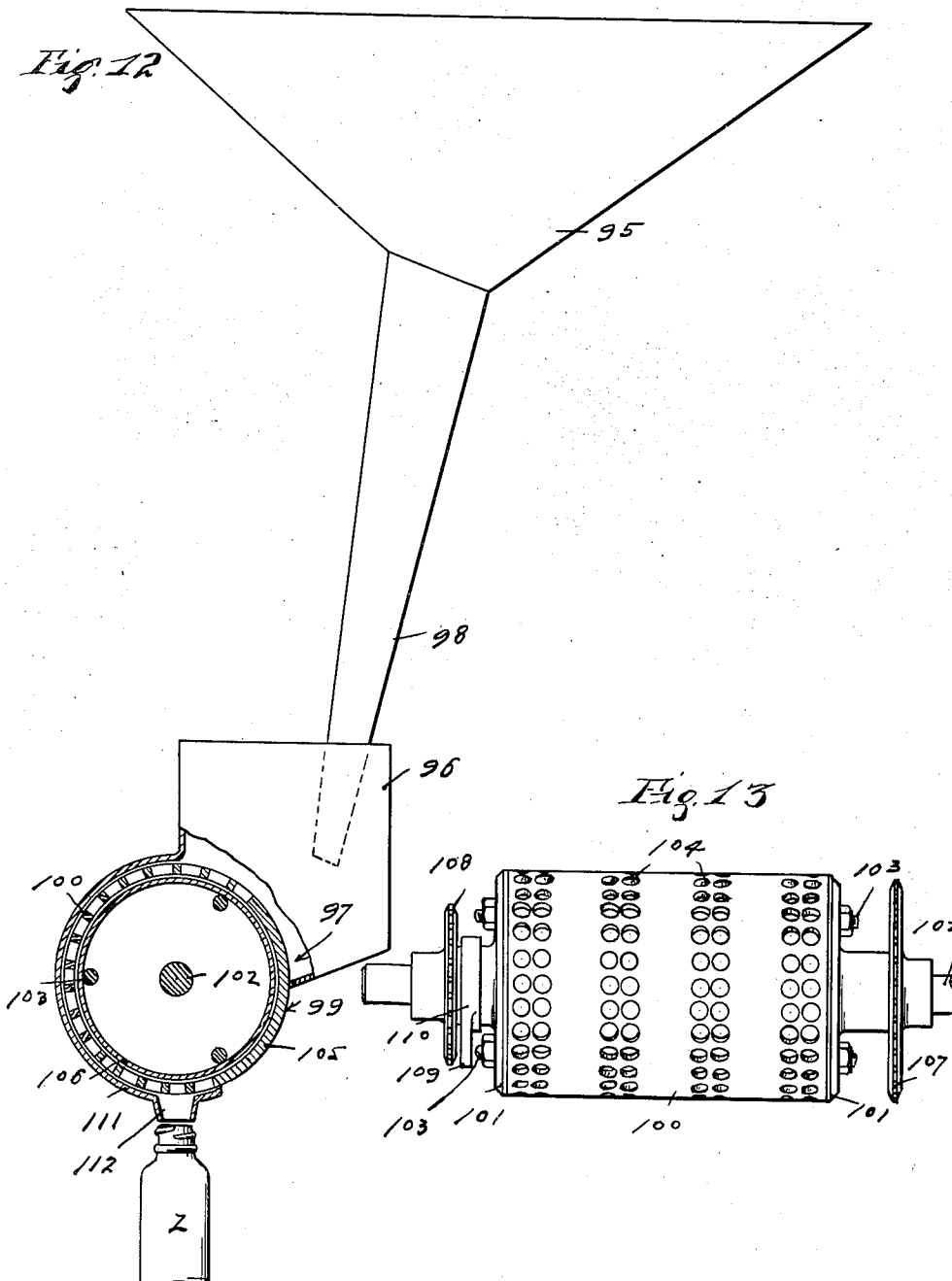
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Fig. 12



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2,509,069

MACHINE FOR SORTING, COUNTING, AND
PACKAGING MEDICINAL TABLETS

Clarence Mrachek, Winona, Minn.

Application October 4, 1945, Serial No. 620,305

8 Claims. (Cl. 226—2)

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My invention relates to improvements in sorting, counting and packaging machines and, more particularly, to a machine for sorting, counting and packaging medicinal tablets.

The objects of this invention are: first, to provide a machine of the class described that is entirely automatic in its action from the time tablets are fed thereto until they are packaged; second, to provide a novel means for sorting medicinal tablets into rows and positions in which they will roll, by the force of gravity; third, to provide novel means for agitating medicinal tablets while they are being sorted; fourth, to provide novel means for guiding medicinal tablets precipitated from a sorter to a counting and dispensing device; fifth, to provide a novel counting and dispensing device; and sixth, to provide novel means for conveying packages to and from a counting and dispensing device.

These and other objects of this invention will be apparent from the following description, reference being had to the accompanying drawings.

To the above end, generally stated, the invention consists of the novel devices and combination of devices hereinafter described and defined in the claims.

In the accompanying drawings, which illustrate the invention, like characters indicate like parts throughout the several views.

Referring to the drawings:

Fig. 1 is a view in side elevation, a portion of the frame being broken away;

Fig. 2 is a view in front elevation, some parts being broken away and other parts being sectioned;

Fig. 3 is a fragmentary sectional view taken on the line 3—3 of Fig. 2;

Fig. 4 is an elevational view of the brush assembly removed from the machine and having only one series of brushes thereon, a portion of the drive shaft being broken away;

Fig. 5 is a plan view of the sorting assembly removed from the machine;

Fig. 6 is a sectional view taken on the line 6—6 of Fig. 2;

Fig. 7 is a sectional view taken on the line 7—7 of Fig. 5;

Fig. 8 is a sectional view taken on the line 8—8 of Fig. 2;

Fig. 9 is a view partly in elevation and partly in section taken on the line 9—9 of Fig. 2;

Fig. 10 is a plan view of the gear box and driving connections associated therewith;

Fig. 11 is a view of a medicinal tablet in edge elevation on an enlarged scale;

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Fig. 12 is a modification of the machine shown in Figs. 1 to 10, inclusive, for handling coated medicinal tablets; and

Fig. 13 is an elevational view of the counting and dispensing wheel shown in Fig. 12 removed from the machine.

Referring first to the invention shown in detail in Figs. 1 to 10, inclusive, the numeral 14 indicates, as an entirety, the skeleton frame of the machine. A hopper 15 is mounted on the upper portion of the frame 14 for holding bulk medicinal tablets *x*, one of which is shown in Fig. 11, on an enlarged scale. The tablets *x* are in the form of disks having convex sides.

In the front wall of the hopper 15, at the bottom thereof, is a tablet escape passageway 16 that extends to the side walls of said hopper. On the front wall of the hopper 15 is a deflector 17 spaced forwardly of and above the passageway 16.

In front of the hopper 15 and mounted thereon is a brush housing 18 having an open bottom and an opening 19 in its top. Within the housing 18 is a brush assembly 20 which includes a shaft 21 that extends transversely through said housing and is journaled in bearings 22 on the frame 14. A long brush holder 23 in the housing 18, that is square in cross-section, is mounted on the shaft 21 by having said shaft extended axially there-through.

Four circumferentially spaced series of tablet-agitating brushes 24 are secured to the brush holder 23. As shown, there are four of these brushes 24 in each series, endwise spaced longitudinally of the brush holder 23 and secured, one to each of the four flat sides of said holder. It will thus be seen that the four brushes 24 of each series extend spirally around the brush holder 23. For the sake of clarity, only one series of brushes 24 is shown in Fig. 4. Connections for driving the shaft 21 includes a sprocket wheel 25 on said shaft.

Directly below the brush housing 18 is a tablet-sorting assembly 26. This assembly 26 is forwardly and downwardly inclined and includes grate bars 27, an apron 28 and a barrier 29. Each grate bar 27 is formed of a folded single sheet of metal. In cross-section, the top of each grate bar 27 is in the form of an inverted V and the sides thereof are parallel and relatively wide. The upper and lower end portions of the sides of the grate bars 27 are extended beyond the tops thereof and the apron 28 and the barrier 29 are mounted thereon and secured thereto. The apron 28 is at the upper end of the assembly 26 and the barrier 29 is at the lower end thereof.

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Said apron 28 and barrier 29 afford cross-ties for the sides of the grate bars 27. The end portions of the tops of the grate bars 27 are drawn to points and extend onto the apron 28 and the barrier 29.

A track rail 30 extends longitudinally in each channel 31 formed by the grate bars 27. Nut-equipped bolts 32 and spacing sleeves 33 support the track rails 30 from the grate bars 27 and hold said grate bars parallel as well as their sides. The track rails 30 extend below the grate bars 27 and are further supported on an upper rail 34 and a lower rail 35. These rails 34 and 35 extend transversely under the assembly 26 and have therein deep notches 36 into which the track rails 30 are fitted. The assembly 26 is supported from the hopper 15 by a bar 37 and hanger straps 38. This bar 37 extends parallel to the rail 35 and is secured thereto by nut-equipped bolts 39. The hanger straps 38 are attached to said bar at its end portions and to the hopper 15.

Bulk tablets x in the hopper 15 slide and roll downwardly from the inclined walls of said hopper, by the force of gravity, through the passageway 16, over the inclined apron 28 and onto the inclined grate bars 27. The reversely inclined surfaces of the tops of the grate bars 27 tilt the tablets x into inclined positions in which they slide sidewise into the channels 31 and drop edgewise into rows on the track rails 30 and roll thereon to a feed assembly 40.

The tablet-agitating brushes 24, which are rotated in the direction of the arrow shown in Fig. 3, wipe over the inclined barrier 29, over the inclined surfaces of the tops of the grate bars 27 and between said bars. Any tablets x coming in contact with the brushes 24 or onto the barrier 29 will be brushed by the brushes 24 upwardly on the grate bars 27 and directed thereby into the channels 31. Tablets x on the apron 28 and the barrier 29 coming in contact with the pointed end of the tops of the grate bars 27 will be directed thereby onto the inclined surfaces of said top and in turn be directed thereby into the channels 31. The two outermost grate bars 27 are half bars and have thereon upwardly and outwardly inclined side members 41.

The feed assembly 40 has a plurality of upright feed spouts 42 that lead, one from each channel 31 to a tablet counting and dispensing assembly 43. In other words, the feed spouts 42 are continuations of the channels 31 and keep the tablets in the same positions as they were in said channels. Each spout 42 is formed by a pair of laterally spaced side rails 44, a back rail 45 and a glass panel 46, and which panel covers all of the feed spouts 42. The back rails 45 extend midway between the side rails 44 and upper and lower rivets 47 and spacing sleeves 48 rigidly connect and space each pair of side rails 44 and the respective back rail 45. The side rails 44 are continuations of the sides of the grate bars 27 and rigidly secured thereto, and the back rails 45 are continuations of the track rails 30 and are rigidly secured thereto.

The side rails 44, below the glass panel 46, are rigidly connected by a cross-tie-plate 49 that rests on the front edges of said rails. The assemblies 26 and 40, in addition to the hanger straps 38, are further supported and held in the frame 14 by a pair of forwardly projecting arms 50 on the cross-tie plate 49 and attached to said frame. As shown, the spouts 42 are arranged in

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pairs and the spouts of each pair converge downwardly and their lower ends are close together.

The counting and dispensing assembly 43 includes a drum-like wheel 51 mounted on a horizontal shaft 52 journaled in bearings 53 on the frame 14. This wheel 51 includes a plurality of axially spaced disks 54, each having in its periphery, two rows of circumferentially spaced tablet pockets 55. This wheel 51 also includes cylindrical members 56 that axially space the disks 54 and a pair of heads 57. Nut-equipped tie-rods 58 extend through aligned holes in the heads 57 and disks 54 and through the cylindrical spacers 56. These tie-rods 58 rigidly clamp the several members of the wheel 51 together.

It is important to note that the several rows of pockets 55 do not extend completely around the wheel 51 which leaves a blank space 59 on the periphery of said wheel between the ends of said rows. During rotation of the wheel 51, the pockets 55 are successively brought under the delivery ends of the spouts 42 and in registration therewith.

It may be assumed that there is a stack of tablets x in each spout 42 and as the pockets 55 are successively brought into registration therewith, the lowermost tablet in each of said stacks drops into the underlying pocket 55. A semi-cylindrical plate 60, on the frame 14, holds the tablets x in the pockets 55 during the period of time in which they are carried from a position at the top of the wheel 51 to a position thereunder. This plate 60 has a short depending spout 61 for each double row of pockets 55.

During each cycle of operation of the wheel 51, there is a period of time in which no tablets x are dispensed by said wheel, due to the interruption caused by the blank space 59 thereon. As the tablets x are positioned by the rotating wheel 51 over the spouts 61, they are precipitated from the pockets 55, through said spouts and into bottles y positioned under the spouts 61. It will thus be seen that the counting and dispensing wheel 51 removes tablets x from the spouts 42 and discharges the same through the spouts 61 and into the bottles y .

The bottles y are moved under the spouts 61 by a conveyor 62 comprising a pair of parallel block chains 63 that run over a pair of idle sprockets 64 and a pair of driven sprockets 65. The upper or operative sections of the chains 63 rests on a bed 66 having side members 67. This bed 66 is mounted on the frame 14 and the pairs of sprocket wheels 64 and 65 are mounted on the shafts 68 and 69, respectively, and which shafts are journaled in the bed side members 67.

The conveyor 63 is operated from an electric motor 70 on the frame 14 by the following connections, to wit: a V belt 71 runs over a pair of aligned V pulleys 72 and 73. The pulley 72 is on the armature shaft of the motor 70 and the pulley 73 is on a shaft 74 that extends into a gear box 75, on the frame 14 and containing differential gear mechanism of which said shaft forms a part. Projecting from the gear box 75, as a part of said mechanism, is a shaft 76 having thereon a bevel gear 77 that meshes with a bevel gear 78 on a shaft 79 journaled in bearings on the frame 14. A roller chain 80 runs over a pair of aligned sprocket wheels 81 and 82, the former is on the shaft 79 and the latter is on the shaft 69 of the conveyor 62. This completes the driving connections from the motor 70 to the conveyor 62.

The driving connections for the counting and dispensing wheel 51 start from the gear box 75

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and include a roller chain 83. Or, in other words, the driving connections for the wheel 51 also includes those from the motor 70 to the differential gear mechanism in the gear box 75. The roller chain 83 runs over a pair of aligned sprocket wheels 84 and 85. The sprocket wheel 84 is on a shaft 86 projecting out of the gear box 75 from the mechanism therein, and the sprocket wheel 85 is on the shaft 52 of the wheel 51.

The brush shaft 21 is driven from the wheel shaft 52 by a roller chain 87 that runs over a sprocket wheel 88 on the wheel shaft 52 and the sprocket wheel 25 on the brush shaft 21.

During the operation of the machine, the conveyor chains 63 move continuously and the bottles *y* thereon are moved intermittently by said chains. The bottles *y*, on the moving conveyor chains 63, are held stationary during the filling of the pockets 55 with tablets *x* from the spouts 42 and said bottles are moved by the conveyor chains 63 during the period of time in which the blank space 59 on the wheel 51 is moving under the spouts 42. The blank space 59, while under the spouts 42, acts as a closure therefor.

To hold the bottles *y* stationary relative to the moving conveyor chains 63 on which they are supported, I provide a stop finger 89 on a lever 90 pivoted at 91 on the frame 14. This lever 90 is yieldingly held in an operative position, by a coiled spring 92 anchored to the frame 14. The stop finger 89 works in an aperture in one of the bed side members 67 and projects in the path of movement of the last bottle *y* being filled with tablets *x*.

The lever 90 is operated, against the action of the springs 92, to withdraw its finger 89 out of the path of movement of the bottles *y* by a cam lug 93 having a collar 94 on the wheel shaft 52. The position of the cam lug 93 on the shaft 52 is such as to have operated the lever 90 to release the bottles *y* at the time the blank space 59 is positioned under the spouts 42 and continues to hold said lever inoperative until the first pockets 55 in the several rows are about to be positioned under said spouts.

As shown, the wheel 51 has four double rows of pockets 55 and tablets *x* are discharged from each double row of said pockets into a single bottle *y*. It will thus be seen that tablets *x* are being discharged simultaneously into four of the bottles *y*. The number of tablets *x* in each double row of pockets is one-quarter of the entire number of tablets *x* required to fill the bottles *y*. The axial spacing of the double rows of pockets 55 is such that there is a bottle *y* not being filled between each two bottles *y* being filled, which acts as spacers therefor. Hence, tablets *x* are being discharged into each bottle *y* being filled during each second rotation of the wheel 51.

Bottles *y* may be placed on the conveyor chains 63 by hand or otherwise, and after the filled bottles *y* pass beyond the stop finger 89, they are moved forwardly by said conveyor chains and removed therefrom by hand or otherwise.

The glass panel 46 permits an operator to watch the feeding of the tablets *x* from the sorting assembly 26 to the counting and dispensing assembly 43.

The modification of the machine shown in Figs. 12 and 13 is designed for handling coated tablets and includes a main hopper 95, similar to the hopper 15, and a secondary hopper 96. Tablets are gravity fed through the discharge passageway 97 in the secondary hopper 95 from a spout

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98, which conveys the same to the secondary hopper 96.

The secondary hopper 96 has an open bottom in which a counting and dispensing wheel 99 rotates. This wheel 99 includes a cylindrical shell 100 between two heads 101 on a shaft 102 and clamped thereon by a plurality of nut-equipped rods 103, which extend through said shell. Found in the shell 100 are double rows of circumferentially spaced round tablet pockets 104. These pockets 104, like the pockets 55, do not extend completely around the shell 100 and leave a blank space 105 on said shell between the ends of said rows. Within the shell 100 is an imperforate shell 106 that forms the bottoms of the pockets 104.

The sprocket wheels 107 and 108, the cam lug 109 and the collar 110 on the shaft are identical with like parts 85, 88, 93 and 94, respectively. Tablets are held in the pockets 104 during their movement from the secondary hopper 96 to the wheel 99 by a semi-cylindrical plate 111 that is concentric with said wheel. The plate 111 is attached to the secondary hopper 96 and has in its under side a short discharge spout 112 for each double row of pockets 104. Bottles *z*, only one of which is shown, are conveyed in the same manner in which the bottles *y* are conveyed.

Tablets are fed from the main hopper 95 to the secondary hopper 96 at such rate that there is never a large accumulation of tablets in said secondary hopper at any one time, so that there is very little weight on the tablets being picked up in the pockets 104.

It will be understood that the invention described is capable of various modifications within the scope of the invention herein disclosed and claimed.

What I claim is:

1. In a machine of the class described, a continuously rotated dispensing wheel having axially spaced circumferential rows of article pockets, the ends of said rows being spaced apart to interrupt the dispensing of the articles, automatic means for sorting the articles to be dispensed and positioning the same in predetermined positions relative to the pockets in the dispensing wheel, a continuously moving endless conveyor for carrying receptacles to receive the dispensed articles, automatic means for successively positioning every other one of the receptacles to receive the articles from each row of pockets whereby the intervening receptacles act as spacers between the receptacles being filled, and for holding the receptacles from being moved by the conveyor during the period of time articles are being dispensed during each rotation of the wheel.

2. In a machine of the class described, a tablet-sorting assembly including a plurality of parallel inclined grate bars, a runway between each adjacent grate bar, a hopper for holding bulk tablets and from which hopper tablets are gravity fed to the sorting assembly at its upper end portion, the top of each of the grate bars being transversely inclined for tilting the tablets and directing the same into the runways, a tablet-dispensing device, and means for conveying sorted tablets from the sorting assembly to the dispensing device in the same position in which they are sorted.

3. A machine as claimed in claim 2 wherein each grate bar includes a pair of spaced apart parallel side walls and a top wall of inverted V-section whereby the tablets are tilted for deposit in the runways.

4. In a machine of the class described, a tablet-sorting assembly including a plurality of parallel inclined grate bars, a runway between each adjacent grate bar, a hopper for holding bulk tablets and from which hopper tablets are gravity fed to the sorting assembly at its upper end portion, the top of each of the grate bars being transversely inclined for tilting the tablets and directing the same into the runways, a tablet-dispensing device having pockets for holding tablets in predetermined positions relative to said device, and means for conveying tablets from the sorting assembly to the dispensing device in the same positions they are to assume in the pockets.

5. In a machine of the class described, a tablet-sorting assembly including inclined grate bars and runways therebetween, means for feeding tablets to the sorting assembly, and a brush assembly including a driven shaft, a brush holder on the shaft, having a plurality of circumferentially spaced sides, a plurality of brushes on the brush holder corresponding in number to the number of sides on the brush holder, each brush comprising sections corresponding in number to the number of sides on the brush holder, the sections of each brush being secured, one to each side of the brush holder, said brush assembly being positioned over the lower end portion of the sorting assembly and its shaft rotated in a direction in which the brushes brush upwardly on the grate bars and therebetween.

6. In a machine of the class described, a tablet-sorting assembly including inclined grate bars and runways therebetween, means for feeding tablets to the sorting assembly, and a brush assembly including a driven shaft, a brush holder on the shaft that is square in cross-section, four brushes, each comprising four sections secured one to each side of the brush holder, said brush assembly being positioned over the lower end portion of the sorting assembly and its shaft rotated in a direction in which the brushes brush upwardly on the grate bars and therebetween.

7. In a machine of the class described, a hopper for holding bulk disk-like tablets, a sorting assembly to which tablets are gravity fed from the hopper, said sorting assembly including inclined grate bars and inclined runways into which tablets are directed by the grate bars to roll

therein, a counting and dispensing wheel having in its periphery axially spaced double rows of tablet pockets that extend circumferentially around said wheel, the ends of said rows of pockets being spaced apart, a spout leading from each runway for successively depositing tablets in the pockets in one of said rows and in positions in which they are positioned in the runways, means for conveying receptacles beneath said spouts and automatic means for successively positioning every other one of the receptacles to receive tablets dispensed from each double row of pockets whereby the intervening receptacles act as spacers between the receptacles being filled.

8. In a machine of the class described, a continuously rotating dispensing wheel having axially spaced circumferential rows of article pockets, the ends of said rows being spaced apart to interrupt the dispensing of the articles, a continuously moving conveyor for carrying receptacles to receive the dispensed articles beneath said dispensing wheel, automatic means to successively position every other one of the receptacles to receive the articles from each row of pockets whereby the intervening receptacles act as spacers between the receptacles being filled and for holding the receptacles from being moved by the conveyor during the period of time articles are being dispensed during each rotation of the wheel.

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