June 7, 1955 C. E. KERR ET AL 2,710,089

ARRANGEMENT FOR DIVIDING CONTAINER SUPPLY LINES

Filed Feb. 23, 1951 7 Sheets-Sheet 1

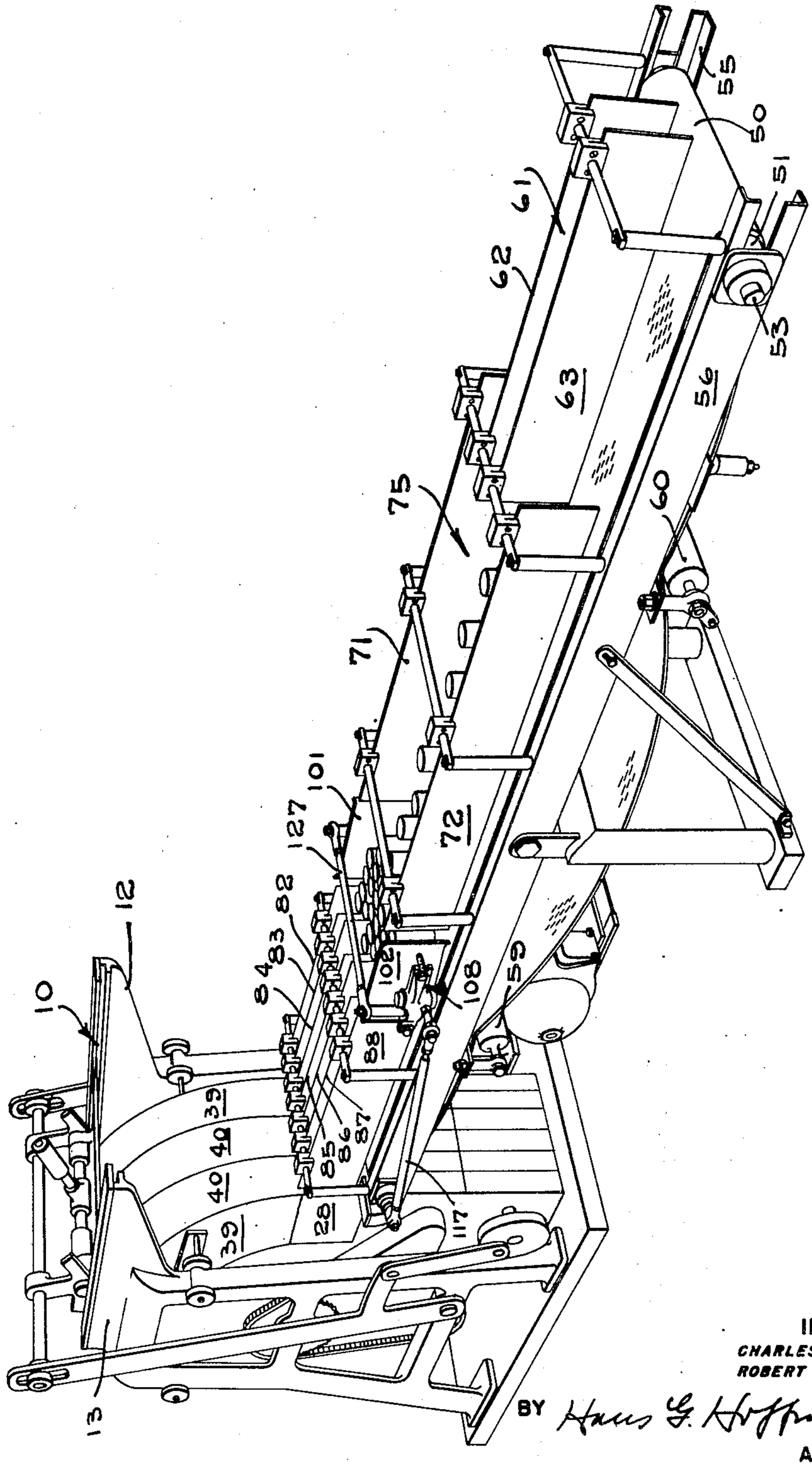

FIG 1

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FIG. 2A

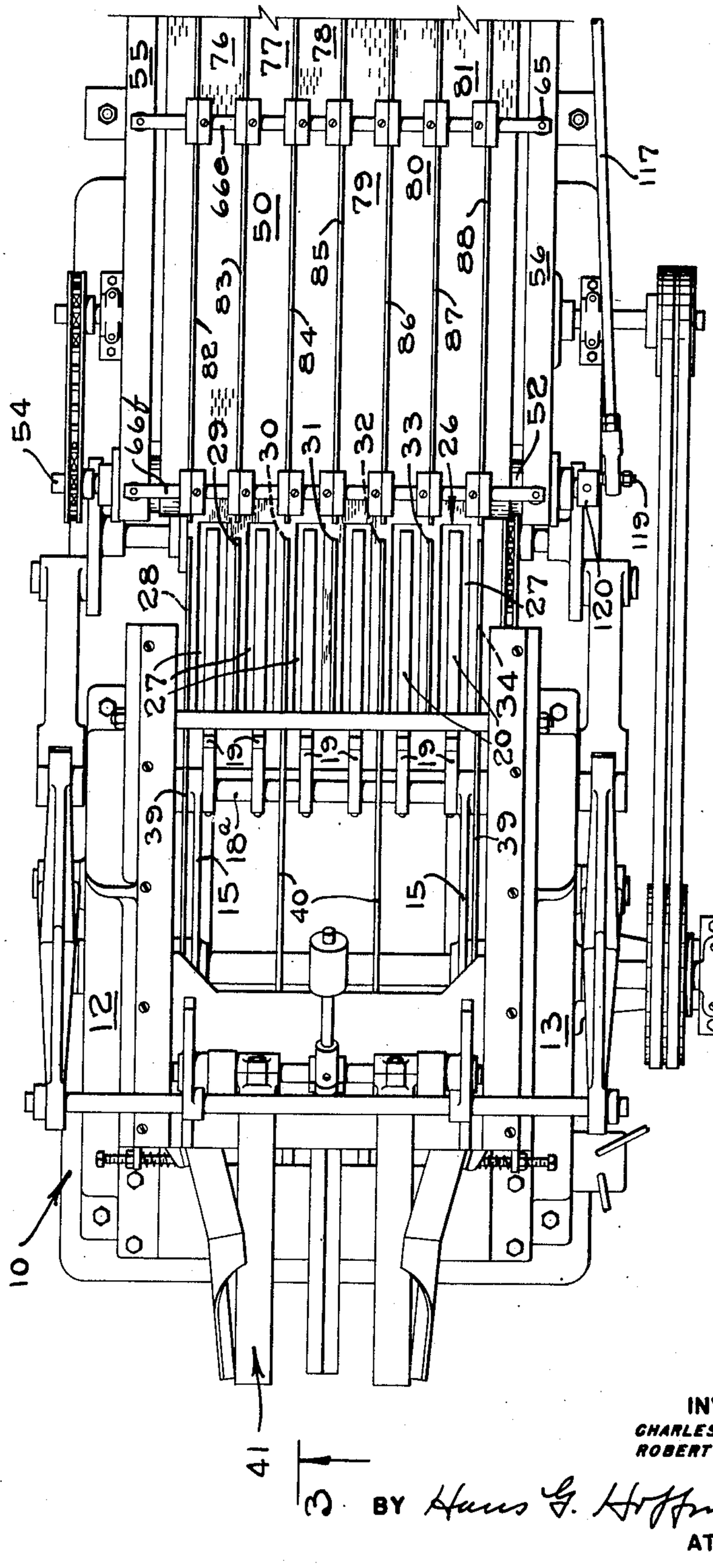

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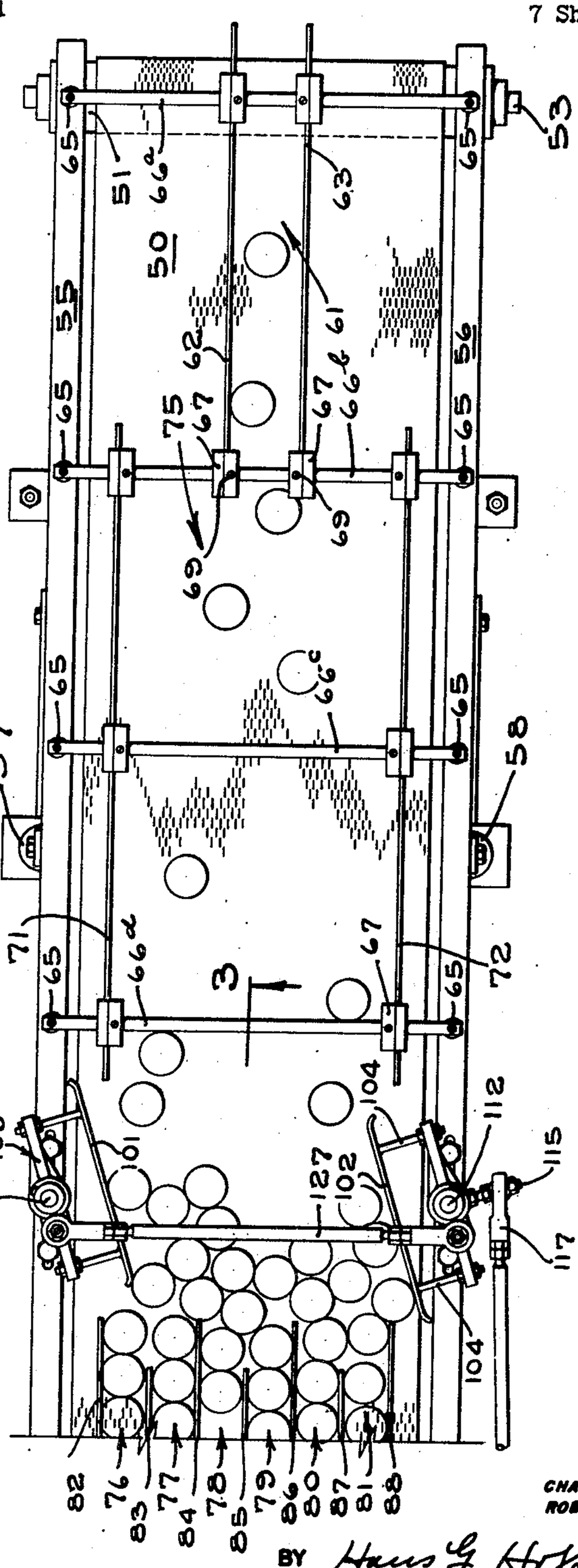
FIG-2



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ARRANGEMENT FOR DIVIDING CONTAINER SUPPLY LINES

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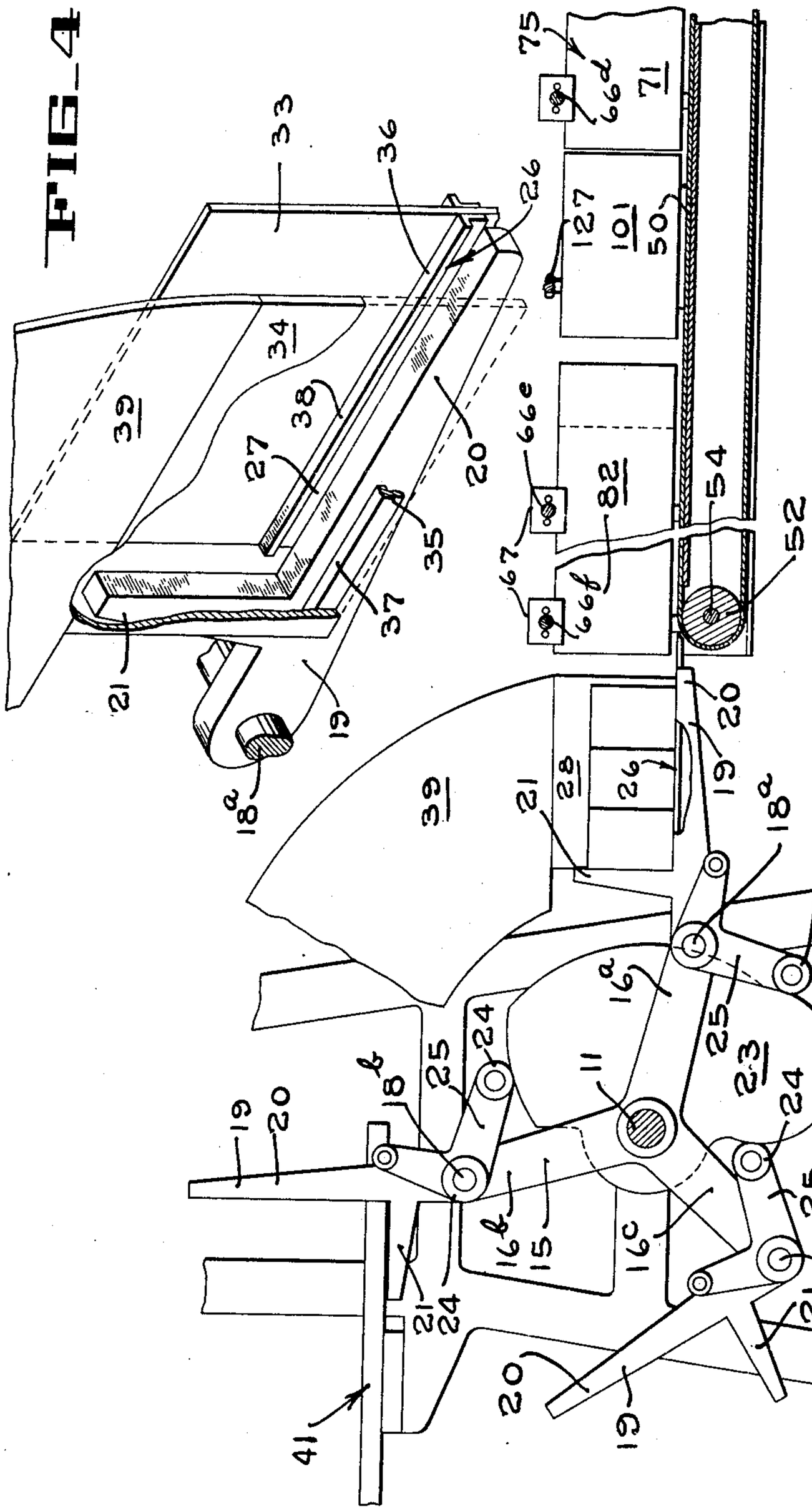
FIG. 4



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ARRANGEMENT FOR DIVIDING CONTAINER SUPPLY LINES

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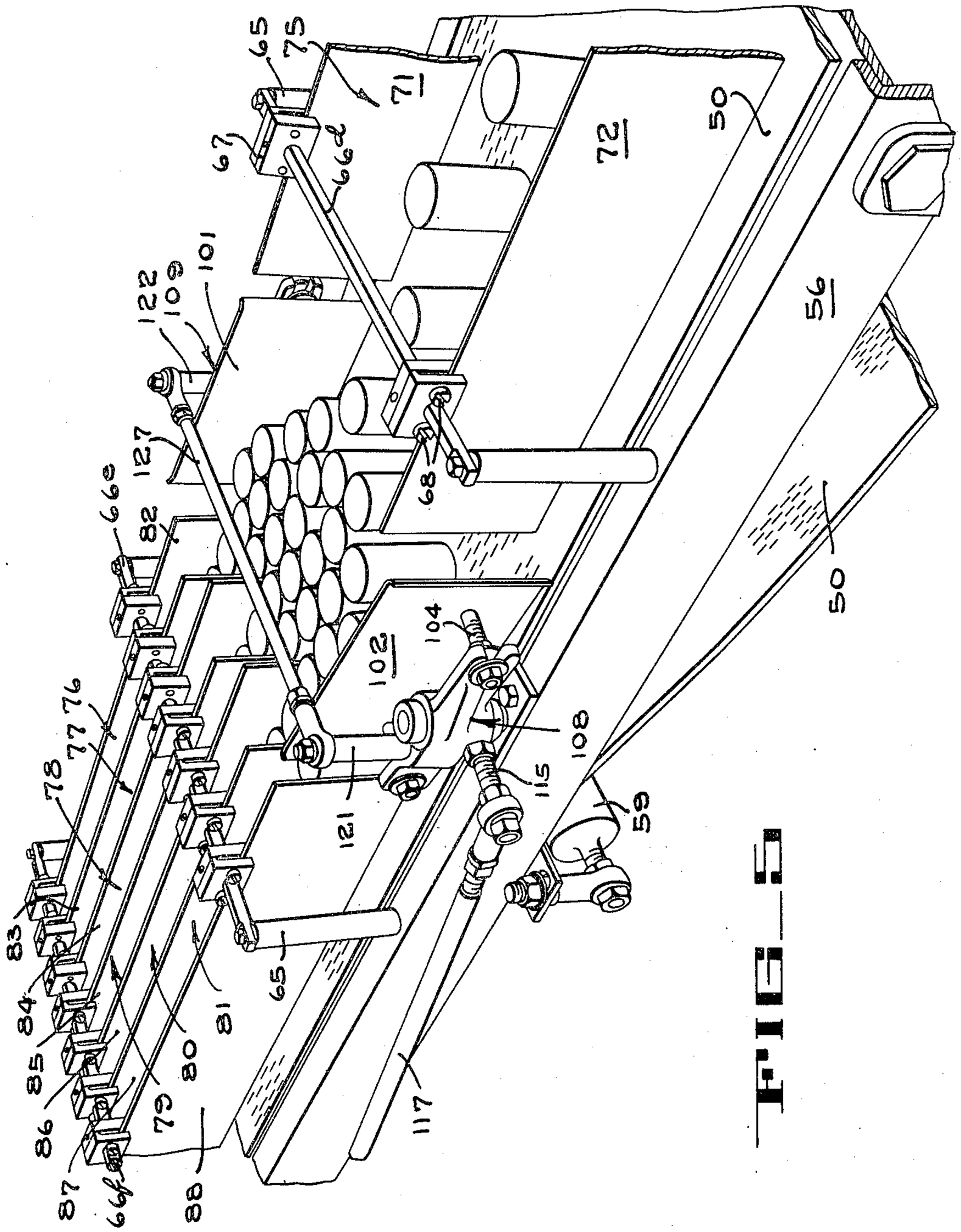

FIG. 5

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ARRANGEMENT FOR DIVIDING CONTAINER SUPPLY LINES

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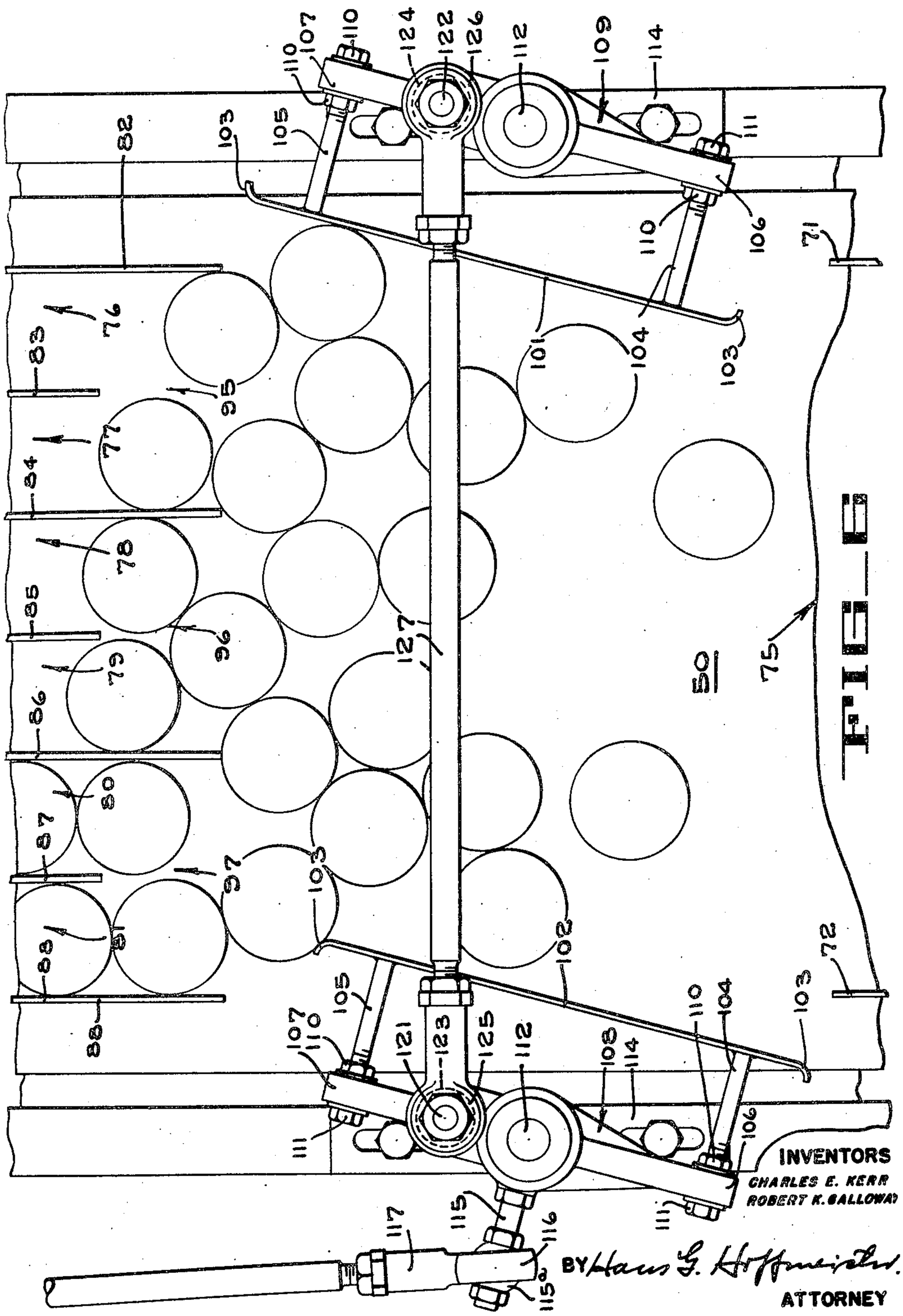

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ARRANGEMENT FOR DIVIDING CONTAINER SUPPLY LINES

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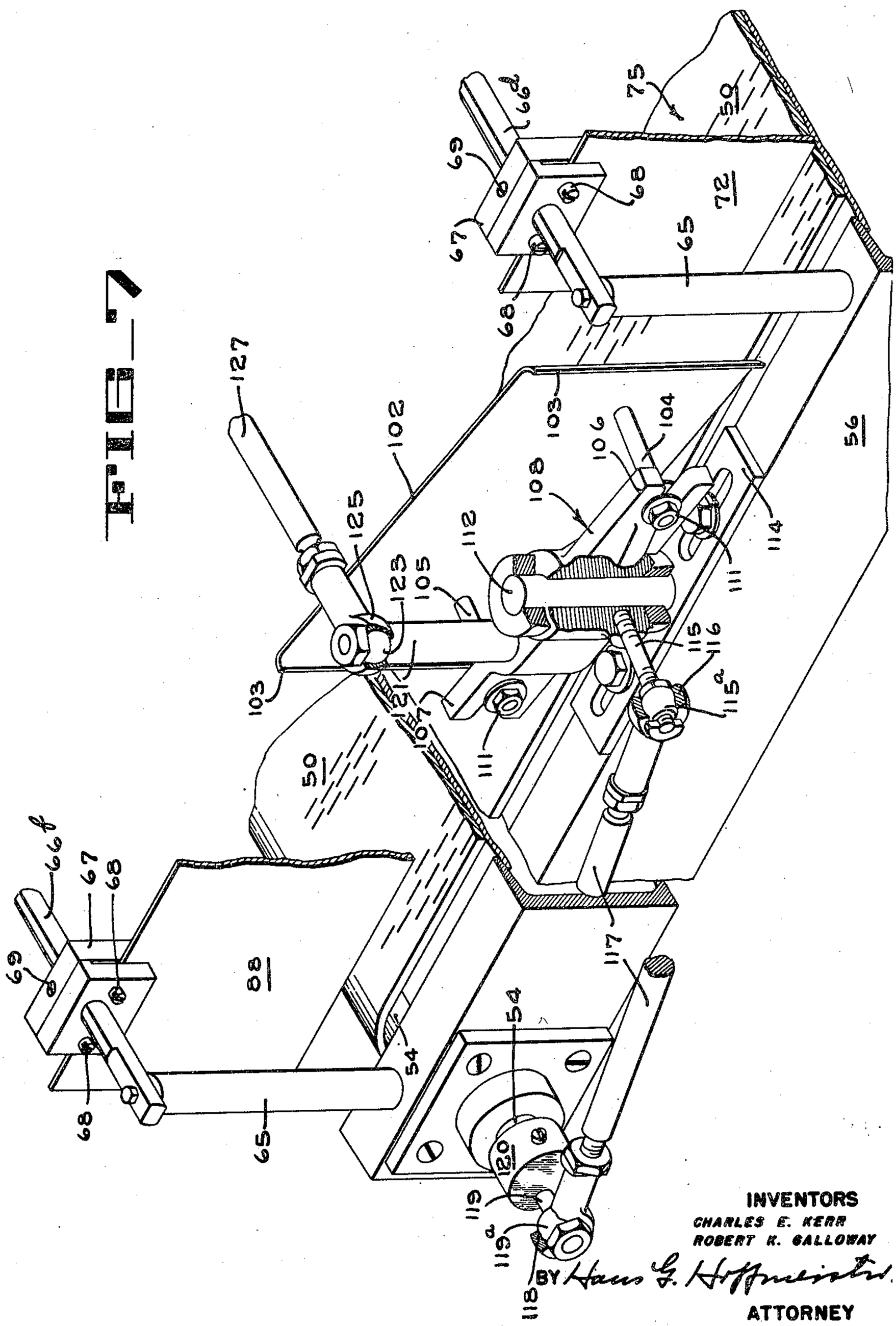
FIG. 7



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ARRANGEMENT FOR DIVIDING CONTAINER SUPPLY LINES

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Application February 23, 1951, Serial No. 212,450

4 Claims. (Cl. 198—30)

The present invention relates to container lines such as may be used to supply containers to machines for packing them into cases, crates or the like. Most of the industrial container handling stations, such as fillers, sterilizers and the like are arranged to receive and discharge the containers in single file lines. Container packing machines, on the other hand, are frequently of a construction which requires that the containers be supplied to them in several parallel files. Thus, such machines may comprise sets of several operationally aligned transfer fingers that are arranged to lift container tiers composed of several adjacent rows of containers simultaneously from the end of a multiple container supply line.

It is an object of the present invention, therefore, to provide an effective mechanism for dividing a container supply line into a desired plurality of separate files.

Another object is to provide a mechanism, of the type referred to, that is adapted to divide a container supply line in a single step into a desired plurality of separate files.

Additionally it is an object to provide a rapidly operating container line dividing mechanism that acts so smoothly as to be safely applicable to containers of a fragile nature, such as glass jars, paper bottles, and the like.

Furthermore, it is an object to provide a container line dividing arrangement, of the type referred to, that is adapted to properly divide a container supply line into a desired number of branch lines, no matter how uneven the arriving containers may be spaced from each other.

An additional object is to provide a mechanism for dividing a container supply line into a multi-file line without positive container-indexing or container-directing means.

A further object is to provide a container supply line comprising a plurality of individual lines, that is adapted to receive its containers from a supply line composed of a smaller number of lanes without danger of improper distribution of the arriving containers over the various lanes of the first mentioned line.

Yet another object is to provide a container supply line comprising a plurality of individual lanes, that is adapted to receive its containers from a supply line composed of a smaller number of lanes without the danger of obstructing any of the coordinated lanes of the first mentioned line due to crowding of containers at any of the entrance ends of said lanes.

Furthermore, it is an object to provide a container distributing arrangement adapted to guide containers from a container collecting area into a desired number of separate container lanes.

These and other objects of our invention will be apparent from the following description of the accompanying drawings which illustrate a preferred embodiment thereof and wherein:

Fig. 1 is a perspective of a container supply line embodying the invention and arranged to supply a container packing machine with six parallel files of containers.

Figs. 2A and 2B are interrupted halves of a plan view of the container packing machine and the container supply line illustrated in Fig. 1.

Fig. 3 is a vertical longitudinal section through the terminal end of the container supply line and the container packing machine taken along lines 3—3 of Figs. 2A and 2B.

Fig. 4 is a fragmentary perspective illustrating one of the container receiving ramps of the container packing machine.

Fig. 5 is an enlarged perspective of the line dividing arrangement forming part of the container supply line illustrated in Figs. 1, 2A, 2B and 3.

Fig. 6 is an enlarged plan view of the line dividing arrangement shown in Fig. 5.

Fig. 7 is a fragmentary perspective of one of the component mechanisms of the line dividing arrangement illustrated in Figs. 5 and 6 with some of its parts shown in section to expose structure underneath.

Referring first to Figs. 1, 2A and 3, the container packing machine **10** with which the container supply line of the present invention is associated by way of example, comprises a horizontal main operating shaft **11** that is suitably journaled in side members **12** and **13** of the machine frame. Firmly secured to the opposite ends of said shaft are angularly aligned spiders **15** which may be composed of three arms or spokes **16***a*, **16***b* and **16***c*. Rotatably received within the bored ends of said spokes are three subsidiary shafts **18***a*, **18***b* and **18***c*, and firmly secured to each of said subsidiary shafts are six transfer levers **19**, each composed of a radially directed transfer finger **20** and a retaining thumb **21** extending at right angles thereto. During operation of the machine the shaft **11** is turned intermittently in counterclockwise direction, as viewed in Fig. 3, and as rotation of said shaft swings the subsidiary shafts **18***a*, **18***b* and **18***c* in circular orbits about the center axis of the machine, the angular position of said subsidiary shafts relative to their own center axis, and hence the position of the transfer levers **19** is determined by a stationary cam **23** secured to the side member **12** of the machine frame. The edge of said cam **23** is engaged by cam follower rollers **24** that are pivoted to arms **25** which in turn are firmly secured to the adjacent ends of said subsidiary shafts **18***a*, **18***b* and **18***c*. The operation of shaft **11** and the conformation of the control cam **23** are arranged in such a manner that, whenever the machine is at rest, one of the subsidiary shafts **18***a*, **18***b* or **18***c* is positioned at the container receiving side of the machine **10**, with the fingers **20** of its transfer levers **19** held in horizontal position somewhat below or flush with container receiving ramps **26** that are provided with longitudinal slots **27** (Fig. 2A) within which the circular orbits of said transfer fingers **20** are contained. Said ramps **26** may be formed by seven transversely spaced parallel guide plates **28**, **29**, **30**, **31**, **32**, **33** and **34**, respectively, that are suitably supported from the machine frame, and secured to said guide plates at either side of each of the transfer fingers **20** are pairs of angle bars **35** and **36** as best shown in Figure 4. The upper horizontal flanges **37** and **38** of said angle bars oppose one another and form between their free edges the hereinbefore mentioned longitudinal center slots **27**. Whenever the proper number of containers has been deposited in upright position onto the ramps **26**, the machine **10** is set in operation to turn the main shaft **11** causing the transfer fingers **20** to rise above the ramps **26** and lift the containers situated thereon between lateral guide members **39** and intermediate partitions **40** onto a suitable case loading chute **41**, while another set of fingers moves from below into

position within the open centers 27 of the container receiving ramps 26, whereupon the machine comes to a temporary halt until the container receiving ramps have again been filled with the proper number of containers. The container casing machine briefly outlined above does not form part of the invention proper. It serves merely to exemplify a container handling machine in connection with which the line dividing mechanism of our invention may be employed to advantage, and is fully described in pending application Serial No. 81,254 filed on March 14, 1949, to which reference is made for details.

To continually supply the container casing machine with the required number of containers, it is necessary that a container supply line be provided that has as many individual supply lanes as there are transfer fingers 20 comprised in each of the transfer lever sets of the machine, and each of these container supply lanes must be aligned with one of the container receiving ramps 26 of the machine. Since the last operation performed on containers to be packed, such as sterilization, cooling or labeling is usually performed in container processing machines that are arranged to receive, process and discharge the containers in a single file line as previously pointed out, it is necessary, therefore, in order to maintain continuity of operation, that the single file container line emerging from the last preceding processing station be converted in a minimum of time and space and with a minimum of mechanism, into as many parallel files as the container casing machine requires for proper operation.

Having again reference to Fig. 1, the container supply line of the invention comprises an endless belt 50 which should be of the type presenting a rough or irregular supporting surface to the cans, and which is preferably made of woven wire as shown. Said belt is of a transverse width at least equal to the total width of the required number of individual container files, and at its opposite ends said belt is trained about rubber rollers 51 and 52, respectively, whose shafts 53 and 54 are rotatably supported in the opposite ends of two parallel channels 55 and 56. At a midpoint said channels 55 and 56 may rest upon a pair of legs 57 and 58, and at the discharge end of the supply line they may be suitably supported from the frame of the container casing machine 10 at an altitude wherein the upper surface of the conveyor belt 50 is positioned flush with, or slightly higher than, the upper surface of the container receiving ramps 26. In the particular embodiment of the invention illustrated in the accompanying drawings the roller 51 at the entrance end of the container supply line is an idler and may be supported from the channels 55 and 56 in a manner permitting adjustment of its position longitudinally of the supply line so as to provide means for tensing the belt. The roller 52 at the discharge end of the container supply line is power driven and turns the belt 50 continuously in counter-clockwise direction as viewed in Fig. 1. For convenience it may be driven from the same source of rotary power as is intermittently applied to the main shaft 11 of the container casing machine. Suitable idler rollers 59 and 60 may be arranged at intervals below the lower run of belt 50 to provide support for said lower run and prevent excessive sagging thereof.

At the entrance end of the described conveyor a corridor 61 for a single file line of containers is established by two parallel guide plates 62 and 63 that are held above the conveyor belt in a manner permitting transverse, longitudinal and vertical adjustment of their position relative to one another and to the conveyor belt. For this purpose pillars 65 are mounted in pairs upon the channels 55 and 56 at either side of the conveyor belt 50 and support cross rods 66*a* and 66*b* upon which are slidably arranged a number of split clamps 67. The guide plates 62 and 63 are engaged with their upper edges between the jaws of said clamps and upon proper adjustment of their location longitudinally and vertically of the conveyor belt 50 they may be clamped into position by cap screws 68 that are more clearly shown in Fig. 5. The transverse width of the corridor established by and between the guide plates 62 and 63 may be varied by adjusting the position of the slidable clamps 67 upon the cross rods 66*a* and 66*b*, and set screws 69 are provided to lock said clamps in adjusted position upon said rods. In this manner the container corridor 61 may be adjusted to adapt it to containers of different diametrical width.

The described single file container corridor extends roughly over the first quarter of the conveyor belt 50 (Fig. 2B) and another pair of guide plates 71 and 72 are supported in the above described manner from the cross rod 66*b* at the discharge end of the single file lane 61 and two additional cross rods 66*c* and 66*d* of identical construction, is arranged to establish an adjoining container corridor 75 that extends approximately over the two center quarters of the conveyor belt 50 and is of a transverse width equal to the total width of the several container files into which the container line entering through the single file corridor 61 is to be divided. In the embodiment of the invention illustrated in the accompanying drawing each set of transfer levers comprised in the container casing machine has six such transfer levers, and accordingly the original container supply line must be divided into six parallel and adjacent container files. Therefore, six parallel single file container corridors 76, 77, 78, 79, 80 and 81 are established at the end of the conveyor belt 50 by seven parallel guide plates 82, 83, 84, 85, 86, 87 and 88 that are supported in the same manner as the guide plates 62, 63, 71 and 72 from additional cross rods 66*e* and 66*f* in longitudinal alignment with the guide plates 28 to 34 that form the side walls and partitions respectively of the container receiving ramps 26 of the container casing machine (Figs. 1 and 2A).

In practical operation the belt 50 is set in motion and advances continuously in counter-clockwise direction as viewed in Fig. 1. A single file of cans emerging from a preceding container handling station, such as a labeler, is directed in upright position onto the belt 50 into the corridor 61. The belt 50 carries the cans in single file formation through said corridor into the transversely expanded space 75 defined by the guide plates 71 and 72. As the cans pass into said space, and the lateral restriction placed upon said cans by the guide plates 62 and 63 is removed, the uneven surface of the wire woven belt 50 causes them to creep laterally away from their original line of advance, as illustrated in Fig. 1 and 2B, and by the time they reach the entrance openings of the terminal corridors 76 to 81 they have laterally spread out in either direction and enter different ones of said lanes, or come against the front edges of the partitions 83, 84, 85, 86 and 87 from where they may be deflected into the adjacent corridors by the traction of the continuously moving belt and by the pressure exerted upon them by succeeding cans. Within the terminal corridors the cans advance and slide onto the ramps 26 of the container casing machine until the foremost can in each corridor comes against the retaining thumb 21 of the particular transfer lever 19 aligned therewith (Figure 2A). As can after can slides from the open space 75 into a particular terminal corridor, the ramp associated with said corridor and said terminal corridor itself is gradually filled to capacity with cans, and later arriving cans will either be deflected from the filled ends of the terminal corridors into adjacent corridors or crowd before the filled terminal corridors. Eventually all the ramps of the container casing machine will be filled with the proper number of cans. At this moment the container casing machine is ready for operation, and its main shaft 11 is set in operation causing the transfer levers 19 to rise above the ramps and lift the cans assembled thereon onto the loading chute 41 (Figures 2A and 3); and as a load of containers is removed from the ramps 26, the cans

that accumulated in the terminal corridors before the ramps surge forward and fill the ramps anew permitting the cans which accumulated in the can reservoir **75** in front of the terminal corridors, and which by this time have spread over the entire width of said reservoir, to advance into said terminal corridors.

In practice it has been found, that while the cans in the can collecting space or reservoir **75** of the supply line will spread over the total width thereof, whenever several or all of the terminal corridors are filled to capacity, container jams are liable to form in said reservoir, for some leading cans may be pressed centrally against the front edges of the terminal partitions **83, 84, 85, 86** and **87**, and succeeding cans may squeeze into the gaps between cans thus halted and the side walls **71** and **72** of the can reservoir **75**. Such congestions, whether temporary or permanent, disrupt the can supply to the container casing machine and thus cause misoperation of the machine or halt its operation altogether. To avoid failures of this kind we stagger the front edges of the terminal partitions **83, 84, 85, 86** and **87** such that the front edges of each two partitions commencing at the same level, transversely of the conveyor belt, are separated from one another by a distance at least as great as the total diametrical width of two adjacent cans. In this manner the terminal corridors are arranged to present to the cans accumulating in the reservoir **75** initial container-receiving gaps or pockets **95, 96** and **97** which are at least as wide as, and thus cannot be clogged by, two adjacent cans; and if three cans should crowd into any one of said pockets, it is impossible for all three of them to come at the same time against a positive obstruction, such as is constituted by the front edges of the terminal partitions if centrally engaged by a can. One can at least will always remain free to escape into one of the terminal corridors and thus provide space for the others to follow suit. In the embodiment of the invention illustrated in the accompanying drawings alternate ones of the terminal partitions are cut back by a distance that should at least be equal to ½ of the diameter of the processed cans, and is preferably equal to a total can diameter as illustrated in Figures 2B, 5 and 6 which show the partitions **83, 85** and **87** cut back in the described manner.

As an additional means for preventing the formation of can jams in the can collecting space or reservoir **75** and for effectively breaking up such jams, if they should occur, means are provided in accordance with the invention for shifting container accumulations in space **75** past the front edges of the terminal partitions in a direction substantially transversely of the conveyor belt. In this manner cans that might be pressed against any of the rearwardly projecting front ends of the terminal partitions **84** and **86**, are laterally detached from said ends and permitted to escape into the can receiving pockets **95, 96** and **97**, respectively. To achieve such transverse shifting movement of container accumulations in space **75**, segments of the side walls of the can collecting space **75** adjacent to the terminal corridors of the conveyor may be arranged for limited unitary rocking movement about vertical axes. Having reference to Figures 2B and 5, the guide plates **71** and **72** of the container reservoir **75** terminate a distance ahead of the flanks **82** and **88** of the terminal corridors, and disposed within the resultant gaps in the side walls of the container supply line are two plates or vanes **101** and **102**, respectively, having outwardly flared edges as shown at **103**. Each of said plates is provided with two outwardly projecting rods **104** and **105** the free threaded ends of which protrude through forks **106** and **107** formed at opposite ends of supporting brackets **108** and **109**, respectively (Figure 7). Upon proper adjustment of the position of plates **101** and **102** relative to their respective brackets **108** and **109**, to properly align them with the guide plates **71** and **72** and the side walls **82** and **88** of the terminal corridors, said rods **104** and **105** may be locked relative to their respective brackets by hex nuts **110** and **111** that are engaged over their threaded ends at either side of the forks **106** and **107** (Figure 6). Each of the brackets **108, 109** is rotatably mounted upon a swivel stud **112** (Figure 7) that rises from a base plate **114** which may be bolted to one of the aforementioned channels **55** and **56**, respectively, that form the frame structure of the container supply line. To oscillate the brackets **108** and **109** over a limited arc about their vertical studs **112**, the bracket **108** is provided with a laterally projecting stud **115** that carries a ball segment **115***a* which is engaged in the apertured end **116** of a pitman **117**. The opposite end of said pitman is likewise apertured as shown at **118** and engages over a ball segment **119***a* at the end of a transverse stud **119** that projects laterally from an eccentric point of a disc **120**. Said disc in turn is firmly mounted upon the projecting end of the hereinbefore described drive shaft **54** of the conveyor belt. In order that both the plates **101** and **102** may oscillate in unison about their respective swivel studs **112**, their brackets **108** and **109** are provided with eccentrically positioned posts **121** and **122**, respectively, that rise above the level of the plates **101** and **102**, and carry ball segments **123** and **124**, respectively, which are rotatably engaged by the apertured ends **125** and **126** of a connector rod **127** (Figure 2B and 6).

During practical performance of the described container casing machine, when the drive shaft **54** operates to turn the conveyor belt **50** in counter-clockwise direction, as viewed in Figure 1, said shaft also turns the disc **120** which reciprocates the pitman **117**. The pitman in turn oscillates the bracket **108** about its swivel stud **112**, and since the bracket **109** on the other side of the conveyor belt is forced to follow the motion of bracket **108**, due to the connector rod **127**, the two plates **101** and **102** at either side of the conveyor belt oscillate in unison about the center axes of their respective swivel studs **112** and **113**. As a result thereof cans crowding at the entrance of the terminal corridors **76** to **81** are continually shifted relative to the front edges of the terminal partitions, as shown by a comparison of Figures 2B, 5 and 6, and no can may, therefore, permanently remain jammed against any one of said front edges. To the contrary, every one of the leading cans is quickly moved into registry with one of the open pockets established by the cut back of the terminal partitions **83, 85** and **87**, and may escape into one of said pockets under the traction of the conveyor belt and the pressure exerted upon it by succeeding containers. Thus, on account of the described oscillating mechanism and the previously described staggered arrangement of the front edges of the terminal partitions, the cans accumulating in the can reservoir **75** are dependably channeled into the various terminal corridors, and there is no danger of interruptions in the can supply to the packing machine due to can jams at the entrance end of the terminal corridors.

While we have described our invention with the aid of a particular embodiment thereof and as applied to a particular container handling machine, it will be understood that our invention is not limited to the particular constructional details shown or described, nor is its utility restricted to container casing machines. It may be usefully employed wherever it is desirable to subdivide a particular container supply line into several coordinated files. It will also be understood that for the arrangement of our invention to operate effectively to establish a desired plurality of separate container files, the containers need not be fed into the container collecting space or reservoir **75** in single file. Our novel container distributing arrangement will operate with equal effectiveness and dependability, if the container-collecting space **75** is supplied with containers through several single file corridors or through corridors adapted to guide more than a single file of containers into the container collecting space **75**.

We claim:

1. Container distributing mechanism comprising means for supporting and advancing containers along a predetermined path, a plurality of partition members arranged to form a plurality of separate container corridors extending longitudinally of said container advancing means, a plurality of guide members pivotally mounted substantially midway of their ends on opposite sides of said advancing means adjacent the entrance ends of said corridors, and means for swinging said guide members in unison on their pivotal mountings to shift containers accumulated at the entrance ends of said corridors in opposite directions and to an appreciable extent transversely of their path of travel.

2. Container distributing mechanism comprising a conveyor for supporting and advancing containers along a predetermined horizontal path, a plurality of partition plates arranged in parallel relation to form a plurality of separate single file container corridors extending longitudinally of said conveyor, a pair of elongated connected guide vanes pivotally mounted on vertical axes substantially midway of their ends on opposite sides of said conveyor adjacent the entrance ends of said corridors, and means for oscillating said guide vanes in unison on their pivotal axes to contact and shift containers accumulated at the entrance ends of said corridors in opposite directions and to a substantial extent transversely of their path of travel to facilitate entrance of the containers into said corridors.

3. A container distributing mechanism comprising means for advancing containers along a predetermined path, means provided on opposite sides of an initial portion of said path to define a space of a transverse width equal to the total width of a desired plurality of adjacently positioned single file container corridors, said space being of a sufficient length longitudinally of said container advancing means to permit containers delivered to said advancing means to spread laterally apart over the total transverse width of said space, a plurality of spaced partition members extending longitudinally of said advancing means to form the desired plurality of single file container corridors along a terminal portion of said path, the forward ends of said partition members being arranged in staggered relation to form container receiving gaps of a transverse width greater than the transverse width of a single corridor, a plurality of guide vanes pivotally mounted substantially midway of their opposite ends on opposite sides of said container advancing means adjacent the entrance end of said corridors, and means for swinging said guide vanes in unison on their pivotal mountings to contact said containers and shift them transversely to an appreciable extent as the containers are urged towards said gaps by said advancing means, thereby moving said containers laterally of said corridors into longitudinal alignment with said receiving gaps.

4. A container distributing mechanism comprising a conveyor for advancing containers along a predetermined path, guide plates provided on opposite sides of an initial portion of said path to define a space of a transverse width equal to the total width of a desired plurality of adjacently positioned single file container corridors, said space being of a sufficient length longitudinally of said conveyor to permit containers delivered to said conveyor to spread laterally apart over the total transverse width of said space, a plurality of parallel partition plates extending longitudinally of said conveyor to form the desired plurality of single file container corridors along a terminal portion of said path, the forward ends of said partition plates being arranged in staggered relation to form container receiving gaps of a transverse width greater than the transverse width of a single corridor, a pair of connected guide vanes pivotally mounted on vertical axes substantially midway of their opposite ends on opposite sides of said conveyor adjacent the entrance end of said corridors, and means for oscillating said guide vanes in unison on their pivotal axes to contact said containers and shift them to an appreciable extent in opposite transverse directions as said containers are urged towards said gaps by said conveyor, thereby moving the containers laterally of said conveyor into longitudinal alignment with said receiving gaps.

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