Oct. 17, 1950 W. A. FERBER 2,526,014

FEEDER FOR STACKS OF NESTED CONTAINERS

Filed Dec. 8, 1948 6 Sheets-Sheet 1

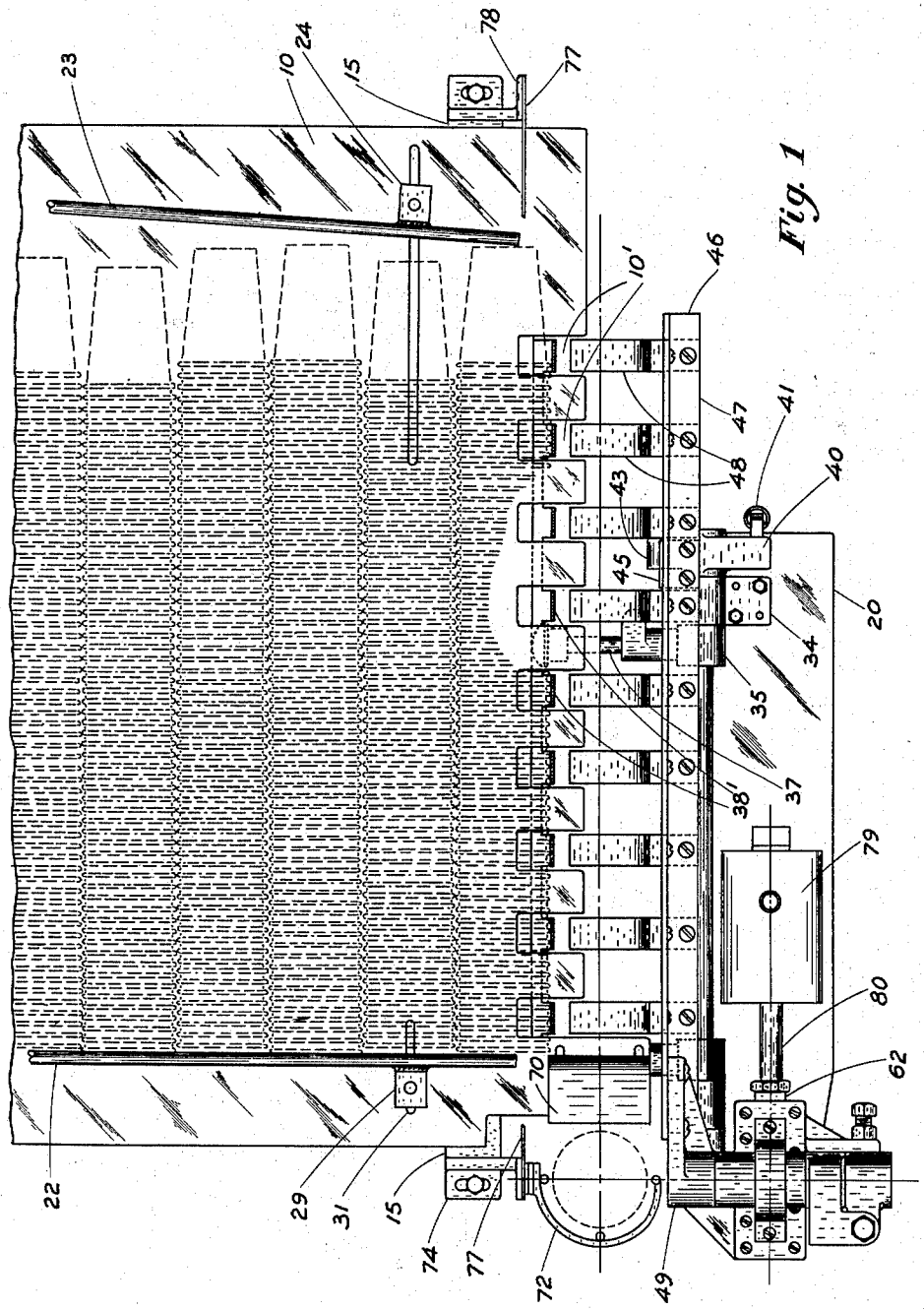


Fig. 1

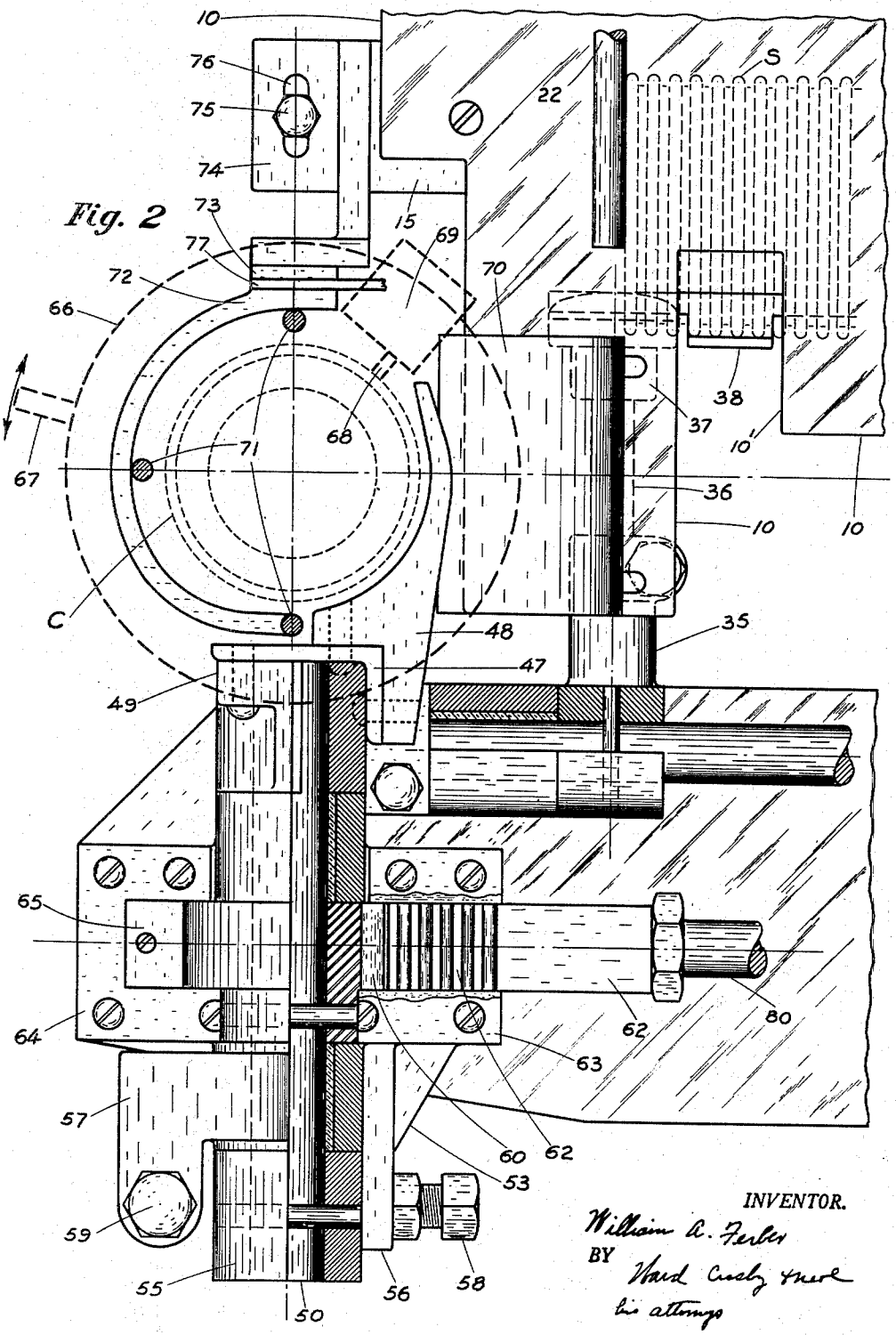
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FEEDER FOR STACKS OF NESTED CONTAINERS

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Fig. 2



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FEEDER FOR STACKS OF NESTED CONTAINERS

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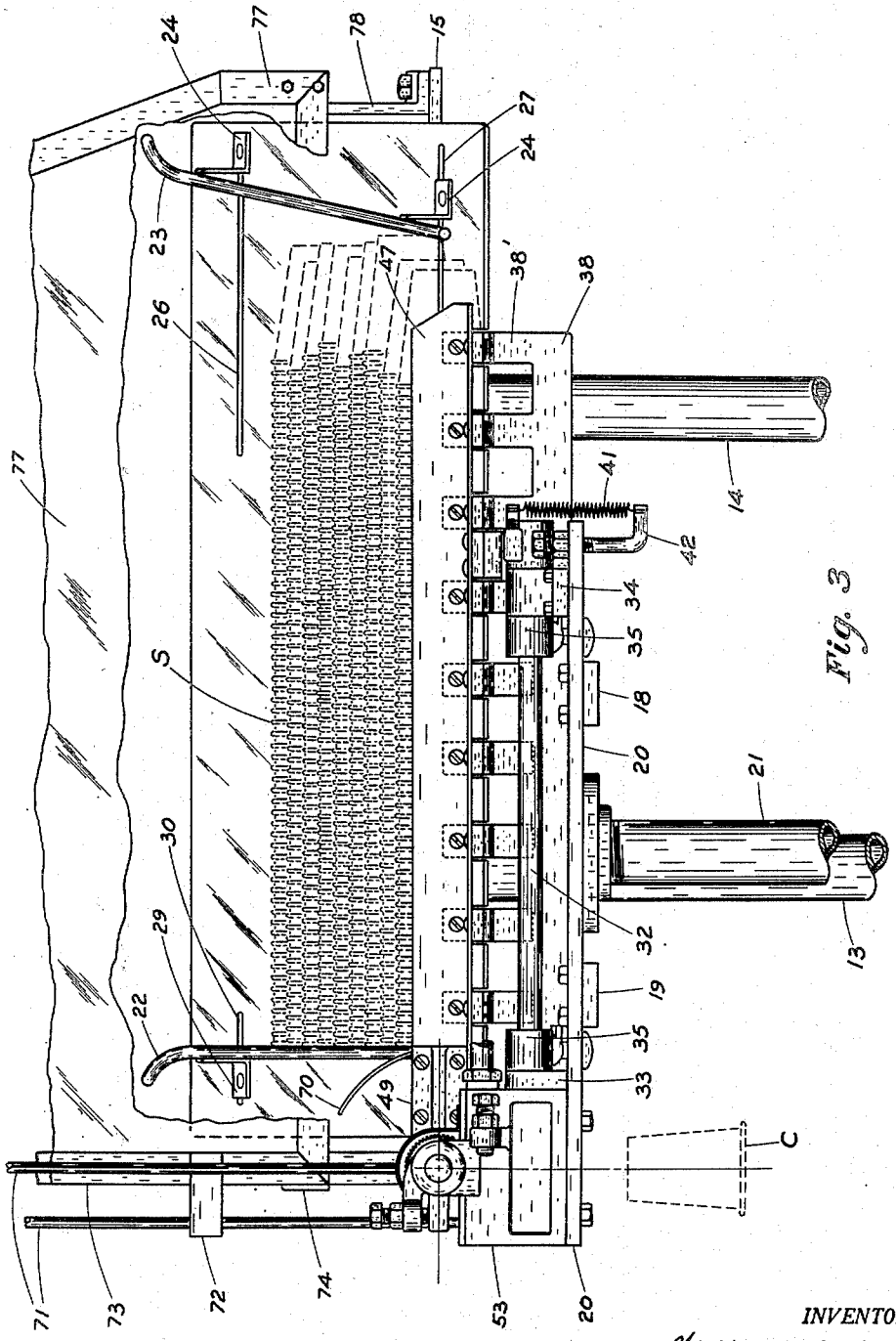


Fig. 3

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FEEDER FOR STACKS OF NESTED CONTAINERS

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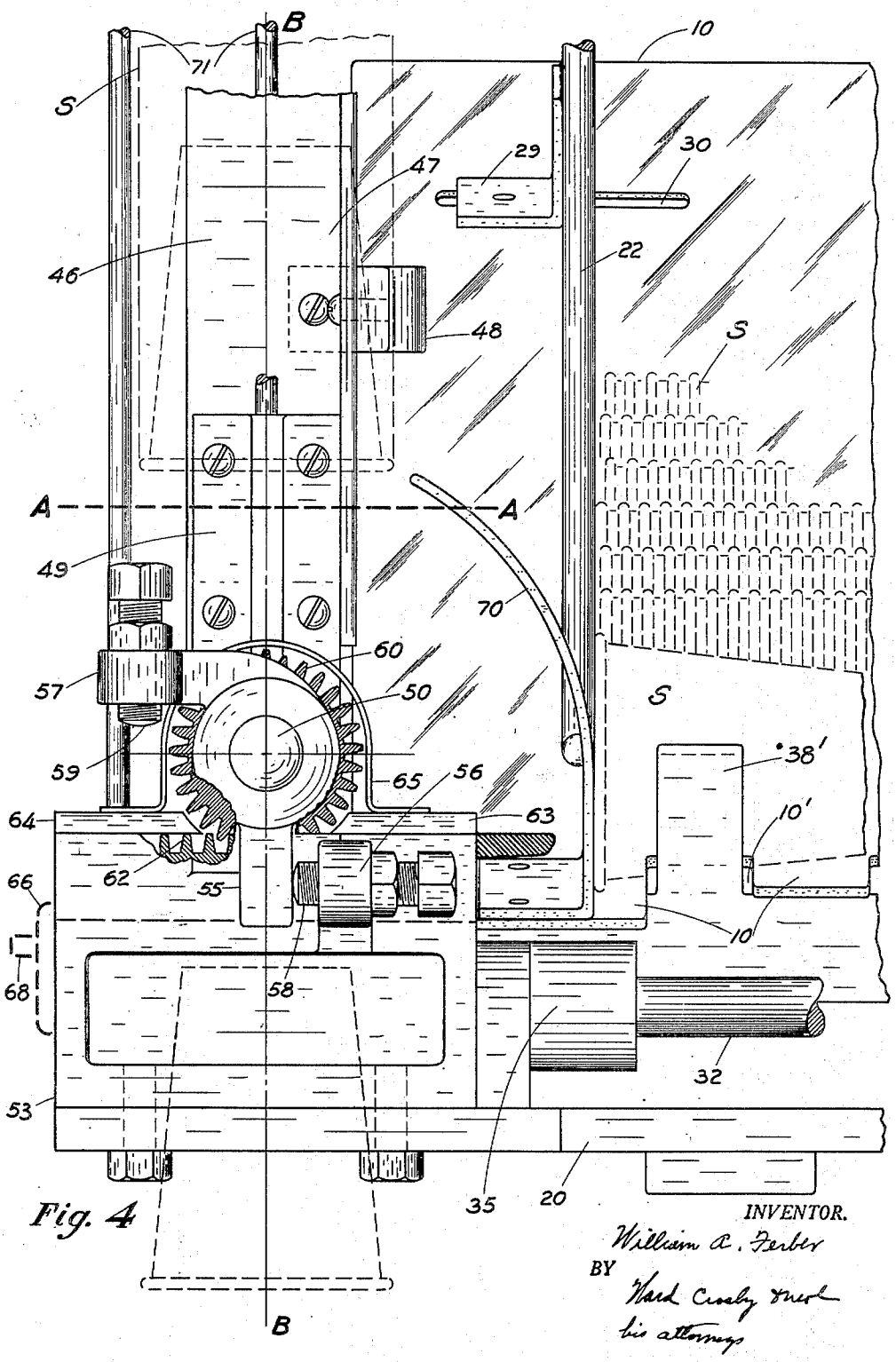


Fig. 4

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Oct. 17, 1950 W. A. FERBER 2,526,014

FEEDER FOR STACKS OF NESTED CONTAINERS

Filed Dec. 8, 1948 6 Sheets-Sheet 5

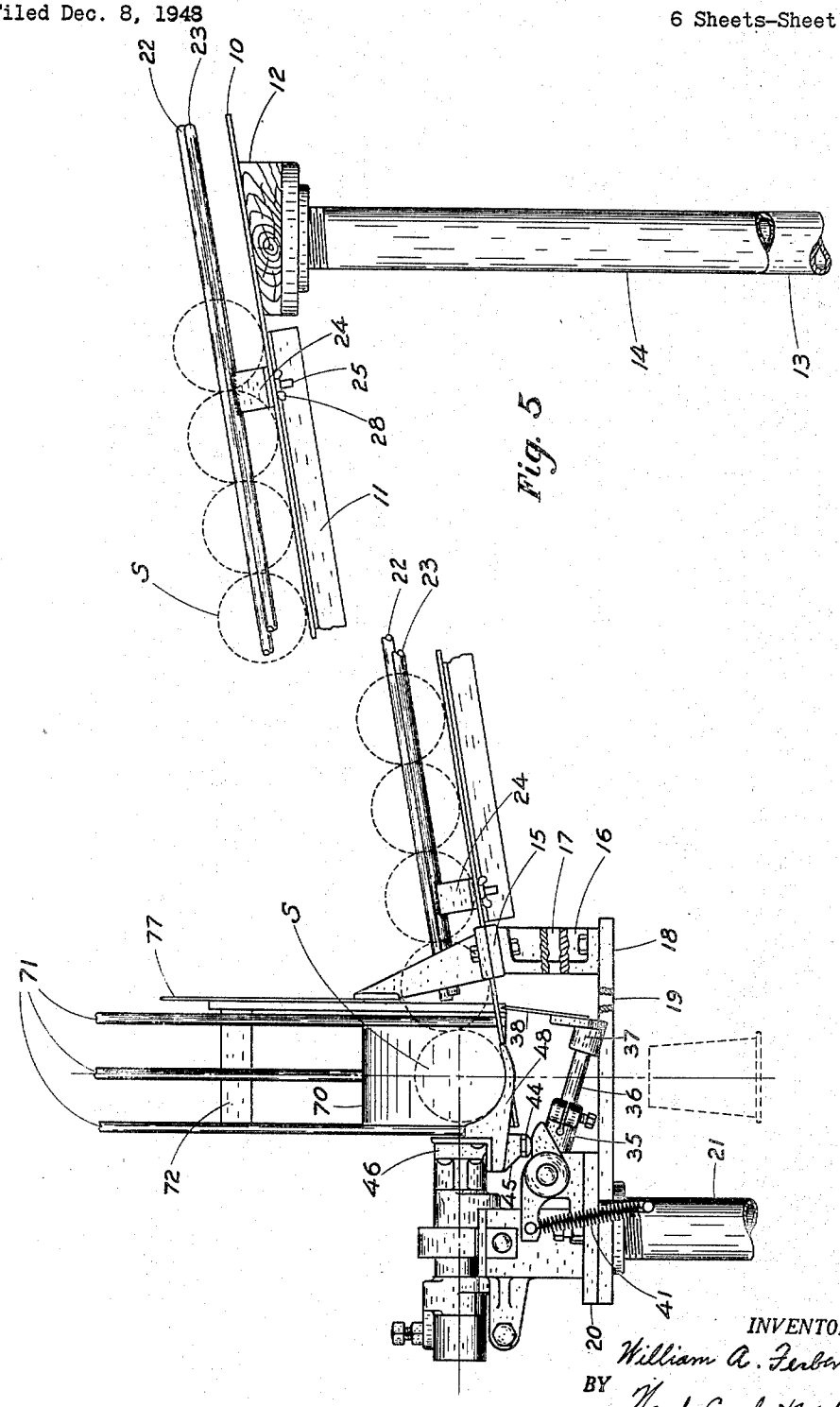


Fig. 5

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FEEDER FOR STACKS OF NESTED CONTAINERS

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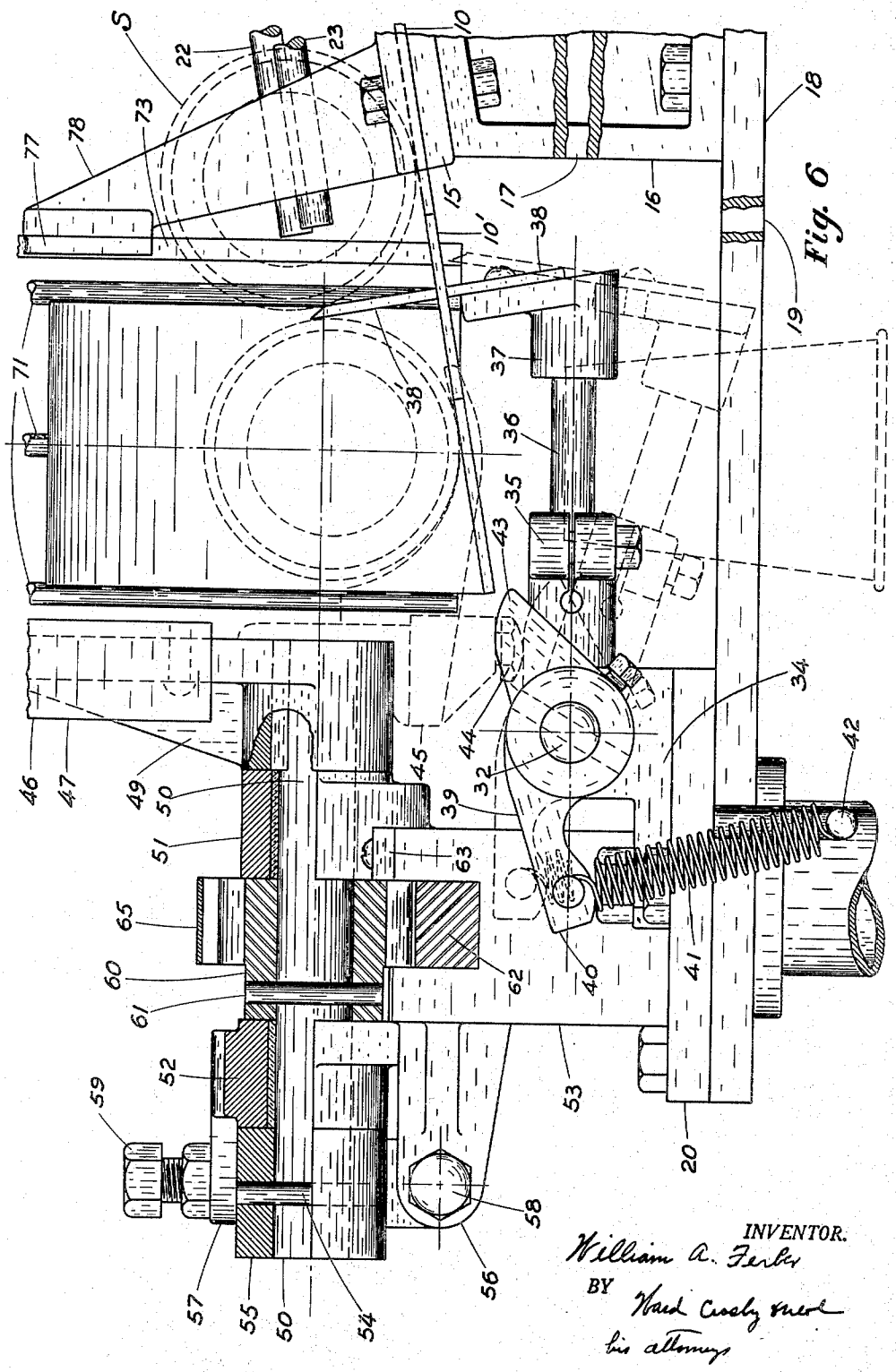


Fig. 6

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Patented Oct. 17, 1950

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UNITED STATES PATENT OFFICE

2,526,014

FEEDER FOR STACKS OF NESTED CONTAINERS

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Application December 8, 1948, Serial No. 64,188

8 Claims. (Cl. 312—44)

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This invention relates to apparatus for feeding stacks of containers, and more particularly for feeding said stacks successively to a given horizontal position and in register with a predetermined vertical axis. The invention is especially adapted to feed said stacks to a dispenser unit, operating upon a stack of containers to dispense individual containers from the bottom of a stack in timed relation to the diminution of a stack of containers in said dispenser.

Individual dispenser mechanisms are used, for example, as a means of dispensing individual containers for operating on said containers, such as in waxing machines where individual containers are dropped onto a conveyor chain which carries them through a paraffine bath or spray. The feeding of fresh stacks to said dispensers has been a serious problem in such an environment where the related mechanism otherwise is essentially automatic. While automatic stack feeding means in general is known for dispensing cups the stack magazine of such devices in which the axes of the stacks are vertical entailed loading difficulties in that such magazines could not be readily or economically loaded with the facility required for high and continuous operative speeds; and such mechanism is not well suited to withstand the rugged requirements of a high speed machine such as a waxer.

An object of the present invention is to provide a stack feeder which may be readily and efficiently loaded, or supplied with a plurality of stacks, and which will feed successive stacks from said supply in proper timed relation.

Another object is to provide a simple and dependable apparatus adapted to be used in conjunction with mechanism operating at a high speed and continuously over long periods of time.

The invention, in particular, relates to means operating in timed relation to a dispenser unit and under control of a feeler finger associated with said dispenser in such a manner as to insure a positive and dependable supply of nested containers to said dispenser at all times, and therefore avoid any gap in the continuous delivery of cups by said dispenser.

Referring to the drawings:

Fig. 1 is a plan view of the device;

Fig. 2 is an enlarged plan view, partly in section, of parts of the mechanism shown in Fig. 1, to more clearly illustrate certain details;

Fig. 3 is a front elevational view of the device shown in Figs. 1 and 2;

Fig. 4 is an enlarged front elevational view, partly in section, of parts of the mechanism

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shown in Fig. 3 to better illustrate certain details;

Fig. 5 is an end elevational view of the device shown in previous figures; and

Fig. 6 is an enlarged end elevational view, partly in section, showing further details of parts of the mechanism shown in Fig. 5.

Referring more particularly to Figs. 1, 3 and 5: a table or runway 10 suitably reinforced by angle irons such as 11 (Fig. 5) supported at its rear tapered block 12 carried on the upper ends of a pair of rear posts (Fig. 3) 13—14 and at its front end by a transversely extending supporting member 15 (Fig. 5) which is carried on the upper end of a pair of brackets 16—17 supported on the rear ends of respective bars 18—19 (Fig. 3) whose forward ends are secured to a supporting plate 20 which is mounted on and secured to a front post 21. The runway 10 is provided with guide rails 22—23 extending in spaced relation across the runway 10 in the direction from the rear toward the front (Fig. 3) and provided with outwardly flaring rear ends to facilitate the placing of stacks S of containers on the runway 10. The rail 22 extending fore and aft in a direction perpendicular to the front edge of the runway and the rail 23 being disposed at an angle to the rail 22 so as to converge toward the rail 22 at its forward end; so that stacks S passing downwardly along the rail 23 will be directed against the rail 22 at its forward end. The rail 23 is preferably mounted so as to be adjustable in a lateral direction to accommodate varying lengths of stacks S; such as by a pair of brackets 24 provided with threaded studs, such as 25, (Fig. 5) passing through slots 26—27, provided in the runway plate 10, and engaged by cooperating nuts such as 28. The rail 22 is similarly supported by a pair of brackets 29 (Figs. 1 and 3) similarly adjustably mounted on plate 10 by means of slots 30—31.

A stop plate shaft 32 (Fig. 3) is supported by end bearings 33—34, securely attached to plate 20, so as to provide for angular movement of the shaft 32. A pair of stop plate stem supports such as 35 are rigidly secured to the shaft 32 adjacent the inner faces of supports 33—34 and are provided (Fig. 6) with plate stems, such as 36, provided on their outer ends with supports, such as 37, which carry rigidly fixed thereto a stop plate 38 notched at its upper edge to provide tongues 38' which are disposed in register with cooperating slots 10' formed in the lower edge of the table 10. An operating lever 39 (Figs. 5 and 6) is rigidly secured to the shaft 32 and is provided with

a forwardly extending arm 40 to which is attached the upper end of a helical tension spring 41 whose lower end is anchored to a pin 42 extending downwardly from and adjustably secured to the plate 20. The lever 39 carries an oppositely extending engageable portion 43 (Fig. 6) engageable by the rounded face of a screw 44 which is adjustably mounted in a block 45 (Fig. 5) carried by the movable feed arm to be more particularly referred to following. It will be seen from Fig. 6 that the tension spring 41 normally holds the stop plate 38 in raised position to prevent the stacks S from moving downwardly beyond the edge of the runway 10, and that upon engagement of the arm 43 by the screw 44 the shaft 32 is rotated so as to move the stop plate 38 to its inactive position, indicated in broken lines.

Referring more particularly to Figs. 1 and 6: the block 45, which carries the screw 44 for operative engagement with the lever end 43, is rigidly secured to a feed arm designated in general as 46. The feed arm 46 comprises an arm member 47 extending substantially parallel to the lower edge of the runway or table 10 and carrying rigidly secured thereto a plurality of carrier fingers, such as 48, spaced apart along the member 47 so as to fall in register with the slots 10', on the outside of the stop plate 38, and of such width as to fit freely therein. The fingers 48 are provided with arcuate concave upper surfaces to conform with the generally cylindrical stack S periphery, so that said stack may be cradled therein. The inner end of the member 47 is rigidly secured to a supporting hub 49—the members 49, 48 and 47 preferably being made of aluminum for lightness. The hub 49 is keyed or otherwise securely fastened to one end of a rack gear shaft 50 journaled in bearing portions 51—52 formed integrally with a rack slide bracket designated in general as 53 supported on and rigidly secured to plate 20. The outer end of shaft 50 carries rigidly secured thereto, as by a pin 54, a feed arm limit stop 55. Fixed arms 56—57 are provided on the bracket 53 and carry adjustably secured therein, respectively, stop screws 58—59 (Fig. 4) for limiting the rotation of the shaft 50, so as to adjust the position of the feed arm 46 in the vertical and horizontal positions desired at the respectively opposite limits of its movement.

A pinion gear 60 (Figs. 6 and 4) is secured to the shaft 50, as by means of a pin 61, and is in driven mesh with a gear rack 62 which is slidably mounted in a guideway formed in the bracket 53. Slide plates, such as 63—64, (see also Fig. 2) are disposed over the rack 62 and are secured to the bracket 53 to form therewith an enclosed guide for the rack 62. Preferably the cover guard 65 is provided to enclose the pinion gear 60 and is fixed in position, as by being secured to the slide plates 63—64. It will thus be seen that upon reciprocation of the rack 62 the gear 60 is caused to rotate and the feed arm 46 is caused to be moved in a vertical plane throughout its cycle of operation, i. e., from a horizontal position (Figs. 1, 3 and 5) where it receives a stack S to a vertical position (as shown in Figs. 2, 4 and 6) where it delivers said stack to a dispenser for dispensing individual containers. Such a dispenser is indicated in broken lines in Fig. 2 as 66 and may be of any suitable type, preferably of the well known screw or worm feed type which upon each actuation cycle separates and delivers the lowermost cup of a stack and returns to a condition to deliver the next succeeding cup; such actuation for example being effected by reciprocation of an engageable handle, such as 67. In the present environment of the invention the handle 67 being engaged by a member which is reciprocated in predetermined time relation. In order that the individual container dispenser 66 will be continuously supplied with containers it is desirable that the stack feeder supply a fresh stack of containers to the dispenser before the previously fed stack is completely dispensed and, accordingly, when a fresh stack is supplied the dispenser will still contain a predetermined number of containers to which the full stack has been reduced. In order to determine when this predetermined extent of stack depletion in the dispenser has been reached a feeler finger is employed in the manner well known in the art. Such a feeler finger is indicated in Fig. 2 as 68 and forms a part of a suitable electrical switch designated as 69. As is well known to those skilled in this art feeler fingers, such as 68, are placed in the path of movement of the containers, such as C, in the stack in such manner that when the inner end of the feeler finger is engaged by the outer diameter of the containers the switch is in inactive position and when the containers have passed vertically downwardly below the feeler finger 68 the switch is activated, i. e., an electrical circuit through the switch is closed. Such electrical circuit is utilized in the present embodiment to actuate the mechanism for controlling the reciprocation of the rack bar 62 in a manner to be more particularly pointed out hereinafter. The vertical position of the dispenser 66 should therefore be disposed below the plane occupied by the lower end of a stack as it is fed into vertical axial alignment with the dispenser. In Fig. 4 the vertical position of the dispenser 67 is indicated in broken outline from which it will be seen that it is disposed an appreciable distance below the lowermost finger 48 of the feed arm 46. The feeler finger 68 is so positioned vertically that at the time that it is passed by the uppermost cup of a diminished stack in the dispenser the upper extremity of said cup is disposed at or about a horizontal plane designated A—A (Fig. 4). This plane being vertically positioned slightly below the upper edge of a guide plate 70 which is rigidly secured to and supported from a forwardly extended portion of the runway 10. The guide plate 70 is provided with a substantially vertical lower portion in alignment with the guide rail 22 and preferably extending upwardly to a point opposite the center of the shaft 50 and gradually curving upwardly and outwardly, preferably along an arc defined by a radius having its center on the axis of the shaft 50 so as to provide an inclined rising plate along which the bottom of a stack S is guided to a position above the plane A—A. In order to assure vertical alignment of a stack S along the dispensing axis a dispenser guide is provided comprising vertically extending rods, such as 71 (Figs. 3 and 4), secured to and carried by a semi-circular bracket 72 fixed to and supported by a vertically extending support 73 secured at its lower end to a bracket 74 which rests upon and is secured to the runway supporting strip 15, as by means of a screw 75 which preferably engages a slot 76 in the bracket 74 to provide for adjustment. Preferably a vertical guard plate 77 (Figs. 1, 3 and 5) is disposed over the lower margin of the table 10 above the path of stacks S and substantially parallel and adjacent to the path of movement of the feeder arm 46. The guard 77 being supported at one end on the face of the dispenser guide member 73 and on the other end by a bracket 78

corresponding to the bracket 74 and similarly mounted opposite thereto on the other end of the member 15, (Figs. 1 and 3). The guard 77 preferably is a sheet of transparent plastic such as "Vinylite."

Actuating means

In the present embodiment the gear rack 62 (Figs. 1 and 2) is reciprocated by a pneumatic motor 79, preferably of the double acting bellows type actuated by compressed air and having a piston 80 whose outer end is securely fastened to the gear rack 62. Introduction of air pressure into the motor 79 at each operating cycle causing the piston 80 to be moved to the right on the power stroke to thereby rotate the pinion gear 60 in an anti-clockwise direction, which in turn moves the feed arm 46 from its horizontal receiving position to its vertical delivering position; and then causing the piston 80 and the gear rack 62 and feed arm to be returned to their initial position. The air pressure is supplied to the motor from any suitable source (not shown) and its introduction into the motor is controlled by a suitable valve actuated by an electrical solenoid energized by an electrical circuit under the control of the electrical switch 69, all of which control mechanism being well known in the art is not shown on the annexed drawings.

Operation

Referring more particularly to Fig. 5: it will be seen that with the feed arm 46 in the horizontal or receiving position adjacent the lower feed edge of the runway 10 the foremost stack S has moved from the table 10 onto the feed fingers 48, at which time the stop plate 38 is depressed to its lower inactive position by means of the pressure exerted on the arm end 43 (Fig. 6, dotted position). As the feed arm 46 commences to move upwardly the feed plate 38 is moved to the solid line position of Fig. 6 serving to prevent the next succeeding stack S from passing off the lower edge of the runway 10. When the feed arm 46 continues its upward movement the inner end of the stack is guided upwardly and over the rising plate 70 (Figs. 3 and 4) and the stack is moved across the upper edge of plate 70 and into vertical alignment with the dispenser axis B—B, such alignment being assured by the dispenser guide rods 71. As soon as the stack has been delivered to the dispenser axis the feed arm moves back to its horizontal or receiving position, the stop plate 38 is depressed to thereby permit the next stack to pass from the runway 10 onto the feed arm 46 and the mechanism is ready for the start of the next cycle, the commencement of which is determined by the feeder finger 68.

Having thus described my invention with particularity with reference to its preferred form, it will be obvious to those skilled in the art, after understanding my invention, that other changes and modifications may be made therein without departing from the spirit and scope of my invention, and I aim in the appended claims to cover such changes and modifications as are within the scope of the invention.

What I claim is:

1. In combination with a dispenser having an upwardly disposed intake throat and a vertical axis for delivering from a stack of nested containers individual containers in a vertical direction, mechanism for feeding said nested stacks of containers to said dispenser comprising a stack feeder having an inner end adjacent to but offset from said dispenser and supported for movement in a substantially vertical plane passing through the axis of said dispenser, actuating mechanism for moving said feeder from a horizontal receiving position to a vertical delivering position, a conveyor for delivering successive stacks in a substantially horizontal position to said feeder, and an inclined rising plate guide extending from adjacent the inner end of said feeder when in horizontal position upwardly and toward said dispenser and terminating in a plane above said dispenser intake throat.

2. In combination with a dispenser having a vertical axis for delivering from a stack of nested containers individual containers in a vertical direction, mechanism for feeding said nested stacks of containers to said dispenser comprising a stack feeder having an inner end adjacent to but offset from said dispenser and supported for movement in a direction substantially parallel to a vertical plane passing through the axis of said dispenser, actuating mechanism for moving said feeder from a horizontal receiving position to a vertical delivering position, and a conveyor for delivering successive of said stacks in a substantially horizontal position to said feeder, said conveyor comprising an inclined runway for holding a plurality of said stacks of nested containers and guiding them to a lower edge, the lower edge of said table being disposed in delivering alignment with said feeder when the latter is in its receiving position.

3. In combination with a dispenser having a vertical axis for delivering from a stack of nested containers individual containers in a vertical direction, mechanism for feeding said nested stacks of containers to said dispenser comprising a stack feeder having an inner end adjacent to but offset from said dispenser and supported for movement in a plane substantially parallel to a vertical plane passing through the axis of said dispenser, said feeder comprising an elongated arm having secured thereto a plurality of transversely extending fingers spaced apart longitudinally and providing aligned arcuate upper faces serving to cradle a said stack of nested receptacles, actuating mechanism for moving said feeder from a horizontal receiving position to a vertical delivering position, a conveyor for delivering successive of said stacks in a substantially horizontal position to said feeder, and an inclined rising plate guide extending from adjacent the inner end of said feeder when in horizontal position upwardly and toward said dispenser and terminating in a plane above the intake throat of said dispenser.

4. In combination with a dispenser having a vertical axis for delivering from a stack of nested containers individual containers in a vertical direction, mechanism for feeding said stacks to said dispenser comprising a stack feeder having an inner end adjacent to but offset from said dispenser and supported for movement in a plane substantially parallel to a vertical plane passing through the axis of said dispenser, said feeder comprising an elongated arm having secured thereto a plurality of transversely extending fingers spaced apart longitudinally and providing aligned arcuate upper faces serving to cradle a said stack of nested receptacles, actuating mechanism for moving said feeder from a horizontal receiving position to a vertical delivering position, and a conveyor for delivering successive of said stacks in a substantially horizontal position to said feeder, said conveyor comprising an in-

clined runway for holding a plurality of said stacks and guiding them to a lower edge, the lower edge of said table being disposed in delivering alignment with said feeder when the latter is in its receiving position.

5. In combination with a dispenser having a vertical axis for delivering from a stack of nested containers individual containers in a vertical direction, mechanism for feeding said stacks to said dispenser comprising a stack feeder having an inner end adjacent to but offset from said dispenser and supported for movement in a substantially vertical plane passing through the axis of said dispenser, said feeder comprising an elongated arm having a concave receiving extension serving to cradle a said stack of nested receptacles, actuating mechanism for moving said feeder from a horizontal receiving position to a vertical delivering position, a conveyor for delivering successive stacks in a substantially horizontal position to said feeder, said conveyor comprising an inclined runway for holding a plurality of said stacks and guiding them to a lower edge, the lower edge of said table being disposed in delivering alignment with said feeder when the latter is in its receiving position, a stop plate mounted for movement to respective active and inactive positions into and out of the path of movement of said stacks from the lower edge of said runway to said feeder, and mechanism for moving said stop plate in cooperative timed relation to the feeder actuation.

6. In a device having a container dispenser for feeding individual containers from a stack of nested containers disposed along a vertical axis with the lowermost end of said stack at the intake throat of said dispenser, a feeler finger disposed in the path of movement of the rims of containers of said stack a spaced distance above said intake throat, an electrical control circuit under the influence of said feeler finger, the combination with said dispenser of stack feeding mechanism comprising a runway provided with guide means for delivering successive stacks in a horizontal position at a feeder station with the axis of said stack substantially coplanar with said vertical dispenser axis, a stack feeder disposed at said station to receive individual of said stacks and pivotally mounted at its inner end for angular movement about an axis substantially normal to said dispenser axis, a drive train for moving said feeder from a horizontal to a vertical position, and motive means for actuating said drive train under control of said control circuit.

7. In a mechanism having a container dispenser for feeding individual containers from a stack of nested containers disposed along a vertical axis with the lowermost end of said stack at the intake throat of said dispenser, a feeler finger disposed in the path of movement of the rims of containers of said stack a spaced distance above said intake throat so as to be actuated when a stack reaches a predetermined state of depletion when its upper end reaches a predetermined horizontal plane, an electrical control circuit under the influence of said feeler finger, the combination with said dispenser of stack feeding mechanism comprising a runway provided with guide means for delivering successive stacks in a horizontal position at a feeder station, a stack feeder disposed at said station to receive individual of said stacks and pivotally mounted at its inner end for angular movement in a plane substantially parallel to a vertical plane passing through said dispenser axis, a drive train for moving said feeder from a horizontal to a vertical position, motive means for actuating said drive train under control of said control circuit, and a stack riser disposed in the path of movement of the bottom of said stack during its feeding movement for positioning the bottom of said stack above said predetermined horizontal plane, whereby said stack may fall in nested continuation on top of said depleted stack in said dispenser.

8. Apparatus for successively feeding nested stacks of containers to a predetermined vertical axis of a cup dispenser with the stack bottom disposed at a predetermined horizontal plane comprising in combination a said dispenser, a stack erector having an inner end pivotally mounted adjacent to but offset from said axis below said plane and supported for movement in a plane substantially parallel to a vertical plane passing through said axis, actuating mechanism for moving said erector from a horizontal receiving position to a substantially vertical delivering position in substantial alignment with said axis, a conveyor for delivering successive stacks in a substantially horizontal position to said erector, and an inclined rising plate guide extending from adjacent the inner pivoted end of said erector when in horizontal position upwardly and toward said dispenser and terminating in spaced relation to said axis and in a plane above said horizontal plane.

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