

# United States Patent

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[15] 3,695,408

[45] Oct. 3, 1972

[54] **CONVEYOR TRACK FOR ROLLING ARTICLES WITH SPACED CATCHES**

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[22] Filed: **March 25, 1970**

[21] Appl. No.: **22,638**

[30] **Foreign Application Priority Data**

Nov. 22, 1969 Germany.....P 19 58 704.3

[52] U.S. Cl.....193/40

[51] Int. Cl.....B65g 11/20

[58] Field of Search.....193/35 A, 32, 40; 198/26, 34, 198/218

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[57] **ABSTRACT**

The pivotal catches located along a conveyor track for rolling workpieces are provided with fluid-operated actuators under the control of switching valves at the respective stations to prevent the passage of a workpiece beyond each catch until the succeeding catch is clear.

**5 Claims, 3 Drawing Figures**

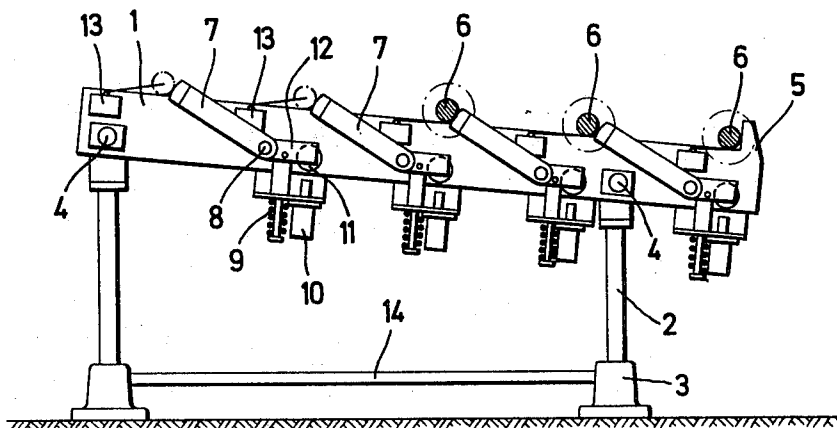


FIG. 1

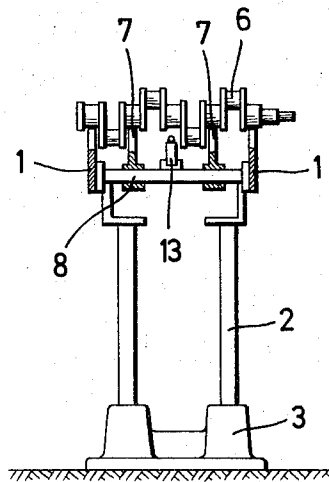
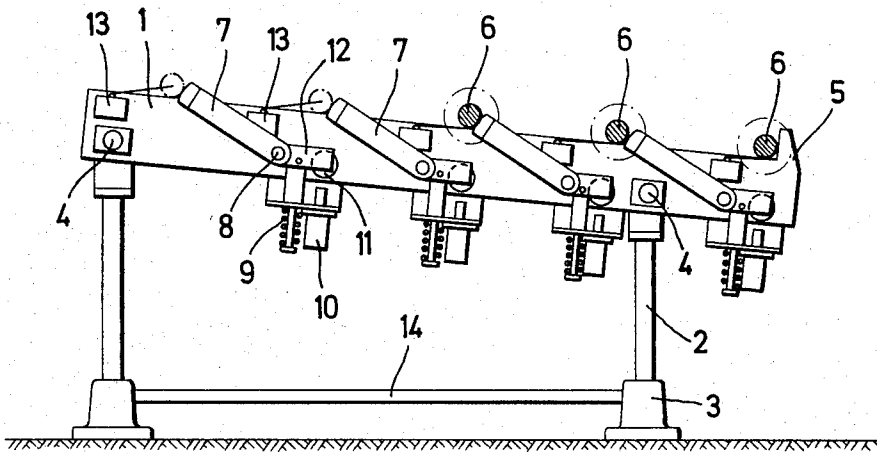


FIG. 2



## CONVEYOR TRACK FOR ROLLING ARTICLES WITH SPACED CATCHES

Conveyor tracks for rolling workpieces with catches located at spaced stations on which the catches are activated by the moving workpiece rolling down the track are already known. These prior art catches consist in general of levers positioned in the roller track between or on the side of the longitudinal support beams. Two single levers situated opposite each other are formed as angular levers and connected with each other by a shaft. The arm pointing in the direction opposite to the rolling direction is heavier than the arm pointing in the rolling direction and rests on a limit stop. The arm pointing in the rolling direction juts into the roller runway. The work piece rolling down the track rolls on the pair of arms which point in the direction of rolling, reversing the catch lever so that the pair of arms which are heavier jut into the roller runway preventing the next following piece from rolling further. As soon as the first piece has rolled across the catch the lighter arms which point in the direction of rolling turn upward again and the following piece rolls on. In a roller track with catches of this kind the weight of the work piece and the weight of the lever, particularly that of the heavier arm, must be very closely adjusted to each other in order to assure that the pieces do roll and, vice versa, that they do not roll too fast. If there is a delay in taking pieces off from the final stop it sometimes happens that several pieces accumulate at the conveyor's end which causes a hindrance to their removal.

The object of the present invention is to create a track with catches activated by the work pieces in which the weight of the catch is independent of the weight of the rolling piece end where there is always only one piece in position at the end of the track.

The solution of this problem is that in front of each catch there is positioned a switching unit which is activated by the rolling piece and coupled with the actuators moving the preceding and the following catch. The switching device will shut off the actuator mechanism of the preceding catch if its own position is occupied, and its own impelling mechanism if the next following position is occupied.

A similar switching device is positioned before the end of the track and shuts off the impelling mechanism of the preceding catch if the end of the track is occupied.

The switching devices are connected in such a way as to shut off the impelling mechanism of their own catch if their position is unoccupied. Further identifying characteristics of the invention are set forth in the description of the figures and in the subordinated claims. In connection with this it is pointed out that all single characteristics and all combinations of characteristics are an essential part of the invention.

FIG. 1 shows a schematic side view of a preferred form of roller track with catches according to the invention

FIG. 2 a schematic front view of the roller track with catches according to FIG. 1

FIG. 3 a schematic diagram of a fluid circuit for actuating the catches according to FIG. 1 and 2.

In FIG. 1 and 2 the numeral 1 indicates the two longitudinal support beams inclined in the direction of rolling of the workpieces, such as crankshafts 6, while

the support posts are indicated by numeral 2, and numeral 3 the bases of the support posts. The bases 3 are connected with each other by cross pieces 14, and the posts 2 by transverse members 4. At the lower end of the track on the beams 1 is positioned a stop 5. On the beams 1 the workpieces 6 roll downward from left to right in FIG. 1. Each catch consists of two angle levers which are attached to the opposite ends of a shaft 8 between the beams 1 and pivotal on this shaft 8. The longer arm 7 of each angle lever points obliquely upward opposite to the rolling direction of the workpieces and its free end juts into the roller runway of the workpieces 6. The workpieces 6 roll down to the free end of the longer arm 7 of one of the catches and are stopped there until the angle lever 7 is turned downward. The actuator acts on the shorter arm 12 of the angle lever. A tension spring 9 urges the arm 12 downward and, consequently, the free end of the arm 7 upward into the roller track, and a fluid working cylinder and piston 10, when activated, moves arm 12 upward, simultaneously turning the free end of arm 12, which abuts against the piston rod of cylinder 10. Cylinder 10 is controlled by a fluid circuit means, shown in FIG. 3, which includes switching valves 13 which are positioned inside the roller track shortly before each catch and are activated by the workpieces 6. Multiple valves serve as switching devices 13. In FIG. 3 a diagram for a roller track with catches according to FIG. 1 and 2 is furnished. In FIG. 3  $V_{01}$  is the switching device associated with the first catch and  $Z_1$  the pneumatic cylinder actuator for the first catch. Switching device  $V_1$  and working cylinder  $Z_2$  are associated with the second catch, switching valve  $V_2$  and cylinder  $Z_3$  with the third catch, switching valve  $V_3$  and working cylinder  $Z_4$  with the fourth catch and switching valve  $V_4$  is associated with the limit stop 5. The third and fourth catch as well as the limit stop 5 are shown as being occupied by a workpiece.

The fluid, which may be compressed air, flows from a source (not shown) through the pressure regulating device 15 to the connection S of each valve. In FIG. 3 the valves  $V_{01}$  and  $V_1$  are shown in the non-activated position wherein the valve bodies having transverse bores indicated by the double-ended arrows are shown in their raised positions while valves  $V_2$ ,  $V_3$  and  $V_4$  are shown in their activated positions wherein their respective valve bodies are in their lowered positions as a result of presence of a workpiece at the respective catches with which the valves are associated. The fluid from the pressure regulator 15 flows into the activated valves  $V_2$ ,  $V_3$  and  $V_4$  from the connection S to connection A of the same valve and from there to connection R of the next following valve. If a valve is not activated and if the preceding valve is activated, the compressed air flows from connection R to connection B of the same valve and from there to the working cylinder of the preceding catch, activating this cylinder and, at the same time, turning the arm 7 of the catch lever (which juts into the roller track) downward. The work piece 6 then rolls down to the next catch. If a valve is activated the flow between connections R and B is cut off by the valve body and the flow between connection B and the opening to the atmosphere for outgoing air P of the same valve is effected. As soon as a valve is activated no more compressed air flows to the working cylinder of the preceding catches. At the same time the cylinder

is connected with the opening for outgoing air P. The tension spring 9 which is connected with each cylinder and acts upon lever arm 12 then pulls this lever back and with it the piston of the cylinder and forces the air outward through the opening for outgoing air P. At the same time arm 7 of the catch is again turned upward until its free end points inside the roller track. If its own position and the preceding one are unoccupied, in each valve the connection R - B is open. In the preceding valve, however, the connection S - A is interrupted and the connection point A is connected with the opening for outgoing air P. Therefore each cylinder can only be activated when the catch associated with it is occupied. If its own and the following positions are occupied the connection S - A exists in this catches' own valve but in the following valve the connection R - B is interrupted and the connection point B connected with the opening for outgoing air P. The catch coordinated with each valve can therefore only be activated if the following catch is unoccupied. In the first valve only the connecting points S and A are used, while the connection points R and B are dead. In the last valve connection point A is dead.

Other modifications and improvements may be made by those skilled in the art which would come within the scope of the annexed claims.

I claim:

1. Roller track conveyor means for workpieces movable in one direction along said conveyor means, including an inclined beam to support workpieces for forward and downward movement along the beam in one direction under the influence of gravity, a plurality of stations for said workpieces spaced along the beam, each of said stations including catch means movable between a first position to prevent movement of a workpiece beyond a respective station and a second position for unobstructed movement of a workpiece beyond said respective station, each catch means also including fluid actuator means for moving the catch means and switching valve means for controlling the respective actuator means, fluid circuit means for connecting said valve means and actuator means with a source of fluid under pressure, said switching valve means being disposed at each station for engagement with a workpiece at that station to position the catch means of the preceding station in said first position to block a workpiece at the preceding station so long as the following station is also occupied by a workpiece, the switching valve means disposed at each station being connected with said fluid circuit means to block the actuator means for the catch means at the respective station to condition the fluid circuit means to maintain the respective catch means in said first position so long as the respective station is not occupied by a workpiece.

2. The invention defined in claim 1, wherein said conveyor means includes stop means for holding a workpiece at a location spaced beyond the last of said stations, said stop means also including switching valve means connected with said first mentioned switching valve means and fluid circuit means and disposed for engagement with a workpiece at said location to position the catch means at said last station in said first position so long as said location is occupied by a workpiece.

3. The invention defined in claim 1, wherein each of said catch means includes an elongated arm pivotally attached to the conveyor means for movement into and out of the path of a workpiece on the conveyor means, the pivotal attachment for the arm being positioned beyond the point at which said arm engages a workpiece whereby the free end of the arm will abut against the leading side of a workpiece and transfer the force of said engagement longitudinally to the pivotal attachment.

4. Roller track conveyor means for workpieces movable in one direction along said conveyor means, including an inclined beam to support workpieces for forward and downward movement along the beam in one direction under the influence of gravity, a plurality of stations for said workpieces spaced along the beam, each of said stations including catch means movable between a first position to prevent movement of a workpiece beyond a respective station and a second position for unobstructed movement of a workpiece beyond said respective station, each catch means also including fluid actuator means for moving the catch means and switching valve means for controlling the respective actuator means, fluid circuit means for connecting said valve means and actuator means with a source of fluid under pressure, said switching valve means being disposed at each station for engagement with a workpiece at that station to position the catch means of the preceding station in said first position to block a workpiece at the preceding station so long as the following station is also occupied by a workpiece, said catch means including an arm pivotally attached to the conveyor means to position the arm in the path of a workpiece in said first position and out of said path in the second position, spring means connected with the arm to urge it into said first position, fluid piston and cylinder means connected with the arm to move it into said second position, said piston and cylinder means being connected for control by the switching valve means of a respective station and the switching valve means of a respective following station.

5. Roller track conveyor means for workpieces movable in one direction along said conveyor means, including an inclined beam to support workpieces for forward and downward movement along the beam in one direction under the influence of gravity, a plurality of stations for said workpieces spaced along the beam, each of said stations including catch means movable between a first position to prevent movement of a workpiece beyond a respective station and a second position for unobstructed movement of a workpiece beyond said respective station, each catch means also including fluid actuator means for moving the catch means and switching valve means for controlling the respective actuator means, fluid circuit means for connecting said valve means and actuator means with a source of fluid under pressure, said switching valve means being disposed at each station for engagement with a workpiece at that station to position the catch means of the preceding station in said first position to block a workpiece at the preceding station so long as the following station is also occupied by a workpiece, each of said switching valve means including an element movable between a first position when engaged by a workpiece to a second position when disengaged,

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said valve means including a plurality of ports connected with the actuator means of the catch means of the respective station of the valve means and the actuator means of the catch means of the respective preceding station and ports connected with said source of fluid with the atmosphere, said element including means for conditioning the fluid circuit means to con-

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nect the actuator means of the respective station with the fluid source and the actuator means of the preceding station with the atmosphere in the first position and to connect the actuator of the respective station with the atmosphere and the actuator means of the preceding station with the fluid source in the second position.

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