MACHINE FOR REMOVING BUNGS FROM KEGS

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FIG. 9.

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ABSTRACT OF THE DISCLOSURE

A multi-station machine has a walking beam which moves a keg from a (1) receiving station to an (2) orienting station, where the bung is stopped in lowermost position, thence to a (3) debugging station where a rotating auger penetrates and removes the bung, then to a (4) sensing station where the presence of improperly conditioned kegs is determined, thence to a (5) discarding station where improperly conditioned kegs are discarded from the novel walking beam, and finally to a (6) discharge station where kegs with bungs removed are deposited for washing and filling in subsequent equipment.

Reference is made to Pat. 3,174,650, on which the present invention is an improvement, which discloses a single-station bung withdrawing assembly. Many of the elements of said assembly are used at one of the stations of the machine hereinafter described.

A principal object and purpose of the invention is to provide an automatic, in-line machine for handling kegs returned from customers preparatory to reusing the kegs. A preliminary step in cleaning the kegs preparatory to refilling is the removal of the wooden or plastic bung which is used to seal the keg after filling and which remains in the keg from the time of filling, through transportation and use by the customer and return to the brewery. A feature of the invention is the fact that the apparatus requires no manual lifting of kegs and very little human attention during the bung removal steps. The machine insures that the bungs are removed, leaving the bung hole clear or automatically rejects kegs which have not been properly handled.

Normal kegs proceed from station to station in the machine hereinafter described without attention of the operator, where the bung is not removed properly, the cause usually is a defect in the keg due to mishandling by the customer or deliverymen. The machine automatically discards from the line those kegs where the bung is not removed so that they may be inspected, repaired or, if necessary, scrapped.

Another feature of the invention is the provision of means to insure that the keg is properly aligned with the bung facing downwardly so that neither the keg nor the auger which drills through the bung is damaged.

A principal feature of the invention is the provision of a novel walking beam which advances the kegs from station to station. Once the keg has been oriented with the bung downward, the keg is not rotated as it moves from the orienting station to the bung removing station thus insuring that once the keg has been oriented, it remains in proper position until the bung has been removed.

Other objects of the present invention will become apparent upon reading the following specification and referring to the accompanying drawings in which similar characters of reference represent corresponding parts in each of the several views.

In the drawings:

FIG. 1 is a side elevation of the machine.

FIG. 2 is a top plan thereof.

FIG. 3 is a section taken substantially along the line 3-3 of FIG. 2.

FIG. 4 is a section taken substantially along the line 4-4 of FIG. 3.

FIG. 5 is a section taken substantially along the line 5-5 of FIG. 2.

FIG. 6 is a section taken substantially along the line 6-6 of FIG. 5.

FIG. 7 is a section taken substantially along the line 7-7 of FIG. 2.

FIG. 8 is a section taken substantially along the line 8-8 of FIG. 7.

FIG. 9 is a section taken substantially along the line 9-9 of FIG. 2.

FIG. 10 is a schematic side elevational view showing how the walking beam advances the kegs from station to station.

The machine hereinafter described is in detail is used in conjunction with a keg 17 which is ordinarily of aluminum or other metal and is formed in the side with a bung hole 18 having an inward turned tapered flange in which a wooden bung 19 seats. The bung 19 has been installed at the time the keg was initially filled and remains in position until after the contents of the keg have been dispensed and the keg has been returned to the brewery or other filling site. A first step in the preparation of the keg for refilling is to remove bung 19. The present machine is an automatic means for accomplishing this result.

The various portions of the machine are mounted along a frame comprising longitudinal horizontal frame members 21 which are connected by transverse frame members 22 and supported above the floor by vertical supports 23. Along the center of the machine is a superstructure 24 which supports some of the machine elements.

Extending longitudinally on either side of the machine are walking beam supports 26 mounted above legs 27.

Walking beam 28 comprises opposed longitudinal members 29 which are connected at either end by transverse members 30. On one of the longitudinal members is downward facing triangular cross-section track 31. Grooved wheels 32 fit under track 31 and are supported on the outer ends of arms 33 at either end of the machine. The other longitudinal member 29 has no track and is supported at either end of the machine by flat wheels 32a, also mounted on the outer ends of arms 33. Front and rear arms 33 are fixed to horizontal transverse shafts 34 which also carry cranks 36. On each side there are wheels 32, 32a at the front and another set 32, 32a at the back and the cranks 36 are interconnected by horizontal longitudinal tie rods 37. Mounted on the front of the machine is an elevating cylinder 39, the rod 38 of which is connected to the front ends of the rods 37. The function of cylinder 39 is to oscillate arms 33 so that wheels 32, 32a raise and lower walking beam 28.

Also mounted on the front of the machine is a longitudinal movement cylinder 41, rod 42 of which is connected to transverse member 30. The function of cylinder 41 is to reciprocate beam 28 longitudinally of the machine, while supported by and riding on wheels 32, 32a.

Supported vertically above walking beam 28 on either side of the machine are cradles 43 which are cut away in saddles 44 shaped to receive kegs 17.

As best shown in FIG. 10, a keg at the rearward end of storage Station I is first elevated above the structure which normally supports the keg at said station. This is accomplished by retraction of rod 38 of cylinder 39 so that wheels 32, 32a swing upward from dotted-line, lowered position to solid-line, raised position. As the wheels 32, 32a rise, the walking beam 28 is raised from its lowered (dotted-line) position to its raised (solid-line) position. This causes each keg 17 to seat in one of the saddles 44 and to be raised above the level of the supports which normally supports the key 17 at each station. The
next step in the sequence of operation is to energize cylinder 41 which slides the walking beam 28 longitudi-
nally rearward, sliding over wheels 32, 32a. Directing attention to the righthand end of FIG. 10, the solid-line position of beam 28 represents the initial (retracted) position thereof and the dotted-line position shows the advance position thereof. When the rod 42 is fully pro-
jected, key 47 which was initially at Station I has been moved to Station II, it being understood that the distance between stations of the machine is uniform and that said distance is the stroke of rod 42. When the beam 28 has been advanced to its full rearward position, cylinder 39 is energized to retract wheels 32, 32a to lowered position causing the walking beam 28 to be lowered to dotted-line position. As the keys 17 are lowered, they are received and supported by support means at each of the stations hereinafter described and are no longer seated in the saddles 44. Hence on the retraction of rod 42, with the walking beam 28 in lowered position, there is no interference with the position of the keys at the saddles stations and the beam returns to retracted position. The cycle is then ready for repetition.

Mounted longitudinally horizontally on either side of the machine at about the elevation of the center line of keys 17 when in work position is a squeeze bar 46 which is supported by support arms 47 from the frame of the machine. Actuating cylinders 48 oscillate arms 47 and bars 46 inward and outward. In inward position, the bars 46 grip the ends of the keys 17 and restrain rotation thereof. Immediately prior to gripping the ends of the keys the bars also function to center the keys relative to the center line of the machine.

Having now described the common elements of the machine namely the frame, the walking beam and its actuating mechanism and the squeeze bars and their actuating mechanism, the individual stations of the machine will be described.

STATION I—STORAGE

After the keys have been received, they are deposited with their axes located transversely on downward sloping tracks 52 whence the keys roll the rear of the machine. At the forward end of each track 52 is a stop 53 which stops the endmost key from rolling beyond its terminus. The height of stop 53 is such that when the walking beam 28 is raised, the key 17 which is in contact with stop 53 is lifted and is moved to the next station, the next key on the tracks 52 rolling down into contact with the stop 53. An electric eye 54 is mounted at the forward end of tracks 52. The function of the electric eye 54 is to stop operation of the machine when there is no key 17 in position for bung removal.

STATION II—ORIENTATION

It is essential to the functioning of this machine that the bung 19 be oriented facing downward so that the bung removing auger (hereinafter described) will drill into the bung beneath the chips and the removed bung will fall away from the key rather than falling into the bung hole. At Station II a means is provided for rotating key 17 until the bung is in proper location with sensing means to automatically sense when the bung is properly located.

Mounted vertically on the center line of the machine extending longitudinally is a side box 61 and supported above either box is a pair of conical rollers 62 upon which the key 17 rests after it has been positioned by the walking beam and the latter has been lowered. Rollers 62 are mounted on horizontal transverse shafts 63 which are supported above boxes 61 by pillow blocks 64. Mounted on one side of the machine is a motor 66 which drives the rollers 62 by means of a chain drive 67. A cross shaft 68 connects the chain drive on the motor side of the machine with that on the opposite side. The chain drives 67 are essentially the same on each side of the machine except for the provision of a motor drive on one side.

To prevent the key 17 from being dislodged when the rollers 62 revolve, a hold down mechanism is mounted on superstructure 24 immediately above Station II. The hold down structure has a frame 71 which supports pairs of hold down rollers 72 which are rotateably mounted in said frame 71. A vertically mounted cylinder 73 is connected to frame 71 and guided by vertical guide 74. After the key 17 has been seated on rollers 72 and before they have begun to revolve at high speed, cylinder 73 is energized depressing the frame 71 from its solid line position of FIG. 1 to its dotted line position where the rollers 72 engage the key 17 and prevent its upward movement.

Pivotedly mounted sensing arm 76 carries a proximity switch sensor element 77 at its outer end and also carries upwardly rearwardly extending sensor supports 78. Arm 76 is pivoted on horizontal transverse pivot 79 and is actuated by means of arm elevating cylinder 81. When the key 17 is in position on rollers 72, the cylinder 81 is energized causing the supports 78 to engage the sides of the key 17 and the sensor element 77 to move close to the path which the bung 19 travels as it rotates in a counterclockwise direction as viewed in FIG. 4. The function of element 77 is to sense metal. Since the bung 19 is wood, when that portion of the key 17 is passed over the element 77 its presence is sensed and through an electronic system, the motor 66 is de-energized, causing the key 17 to stop with bung 19 lowermost as viewed in FIGS. 3 and 4. The squeeze bars 46 function to hold the key 17 in aligned position as the walking beam moves the key from Station II to Station III and hence the bung is lowermost when the key 17 reaches Station III.

STATION III—DE-BUNGING

The frame members 21 at this station are connected to side boxes 86 at either side of the machine from which extend upwardly notched stationary saddle plates 87 on which the key rests after it is deposited at the station by the walking beam. Supported by the super structure 24 immediately above this station are hold down saddles 88 which are vertically reciprocated by cylinder 89 and its guide 91. Thus after the key 17 is deposited on plates 87, cylinder 89 lowers saddle plates 88 onto the top of the key preventing rotation thereof and also supporting the key during the operation which bares out the bung 19.

Mounted centrally of the station is auger support 96 which is held in position by means of tripod legs 97. Above support 96 is a stripper cage 98 having an opening 99 at the top. Auger 101 similar to that illustrated in Pat. 2,747,650 is mounted on top of handle 102 which is an elongated member carrying motor 103 at its lower end. A guide bracket 104 attached to member 96 and slidable with respect to spindle extension 107 prevents relative rotation of motor 103 and the machine. Member 96 is formed with a cylinder 106 and extension 107 carries a piston 108 reciprocating therein. Thus the auger 101 is lifted up through opening 99 to bore the bung and as it retracts, the stripper 98 breaks and discards the pieces of bung.

STATION IV—PROBE

As best shown in FIGS. 7 and 8, the key which has been de-bunged is delivered by walking beam 28 to Station IV. It will be understood that for various reasons, such as damage to the key 17 during previous handling, the bung may not properly be removed. At Station IV, the presence of a bung in hole 18 is detected so that at the next station the key may be discarded.

Opposed pairs of conical rollers 111 similar to rollers 62 are positioned at Station IV. They are mounted on horizontal transverse stub shafts 112 supported in pillow blocks 113 on side boxes 86. Rollers 111 hold the key during the probing operation. Immediately above this station and supported by superstructure 24 is a frame 126 carrying a pair of hold down rollers 127. Frame 126 is reciprocated vertically by means of cylinder 128 and guide 129. Thus when the walking beam delivers the key 17
to Station IV the cylinder 128 depresses the rollers 127 so that they hold the keg against vertical dislodgement.

Mounted on traverse member 22 is a cylinder 116, the rod 117 of which is connected to a probe 118 which is shaped to seek and fit into the bung hole 18. Guide rod 119 is secured by means of bracket 121 to probe 118 and is supported by second bracket 122 attached to cylinder 116. A limit switch 131 is connected to guide rod 119 and closing of this switch indicates that the hole 18 is unobstructed. In a normal keg 17 from which the bung has been properly removed, upward movement of sensing element 115 to the elevated position shown in FIG. 8 occurs and sue switch 131. However, if a bung should remain in hole 18 or if there is other blockage to movement of probe 118, switch 131 is not closed and through relays and time delays causes rejection of the keg when it has reached the next station.

STATION V—DISCARD

The walking beam 28 delivers keg 17 to a central support rack 136 supported above traverse member 22 by pedestal 137. If the keg has been found normal at the preceding station, it merely remains on the rack 136 for one cycle of movement of the walking beam and the keg is then deposited on the next forward movement of the walking beam to the downwardly forwardly inclined tracks 146 which lead the keg to a washing station.

Where, however, at the probe station the keg 17 has been found defective, a relay and time delay causes said keg to be moved transversely onto said rails 139 which extend laterally of the machine and are supported on the frame by means of support 138.

On the side of the machine opposite skid bars 139 is a vertical bracket 141 which has a cylinder 142 at the upper end thereof disposed horizontally transversely and also carries a guide 143. The rod of cylinder 142 is connected to pusher members 144. When the pusher members 144 move between the solid line position of FIG. 9 to the dotted line position, they push the keg 17 laterally off the machine and onto the skid bars 138.

What is claimed is:

1. A machine for removing a non-metallic bung from a metallic keg comprising a frame, transport means having equidistantly spaced keg support means spaced longitudinally along said transport means and actuating means for said transport means to move a keg in equi-distant increments along said frame, and a series of work-performing mechanisms at stations spaced apart along said frame by said increments, said series comprising a storage station having a rack to support a plurality of kegs with means to positively locate the endmost of said kegs; an orienting station comprising support wheels for said kegs, drive means for revolving said wheels to turn said kegs, sensor means for sensing the presence of non-metallic bungs as the kegs rotate in proximity to said sensor means, and means to de-activate said drive means upon signal from said sensor means with said bung downmost; a de-bunging station comprising a keg support to hold a keg received from said orienting station, an auger having its shaft vertically mounted below said keg support, means to rotate said auger, means to reciprocate said auger from a retracted position below said keg support to a raised position with said auger boring into said bung; and a discharge station to receive de-bunged kegs.

2. A machine according to claim 1 in which said transport means comprises an open frame and said actuating means comprises elevating means for raising and lowering said open frame and reciprocating means for projecting and retracting said open frame relative to said frame in said increments.

3. A machine according to claim 1 which further comprises squeeze bars on opposite sides of said machine, means mounting said squeeze bars for oscillation inward or outward of said frame and squeeze bar actuating means for oscillating said squeeze bars, said bars in inward position gripping the ends of said kegs to center said kegs and restrain said kegs against rotation.

4. A machine according to claim 1 which further comprises a superstructure above said frame, first and second hold-down means above each of said orienting and de-bunging stations, each said hold-down means having keg-engaging means to engage a keg, and hold-down actuating means for reciprocating each of said hold-down means between an elevated position out of contact with said kegs and a lowered position holding said kegs against upward displacement.

5. A machine according to claim 1 which further comprises a probe station beyond said de-bunging station and a discard station between said probe station and said discharge station; said probe station having a keg support, a probe dimensioned to fit inside a bung hole, means mounting said probe for vertical reciprocation, and probe actuating means for raising said probe to fit inside a bung hole and obstruction sensing means for sensing an obstruction in said bung hole; said discard station having a keg rest, a pusher and pusher actuating means for moving said pusher to push a keg transversely off said rest, said pusher actuating means being actuated when said obstruction sensing means has sensed obstructed bung hole at the time a keg was positioned at said probe station, said pusher actuating means including a time delay having a time lag equal to the time of movement of a keg from one station to the next.

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