

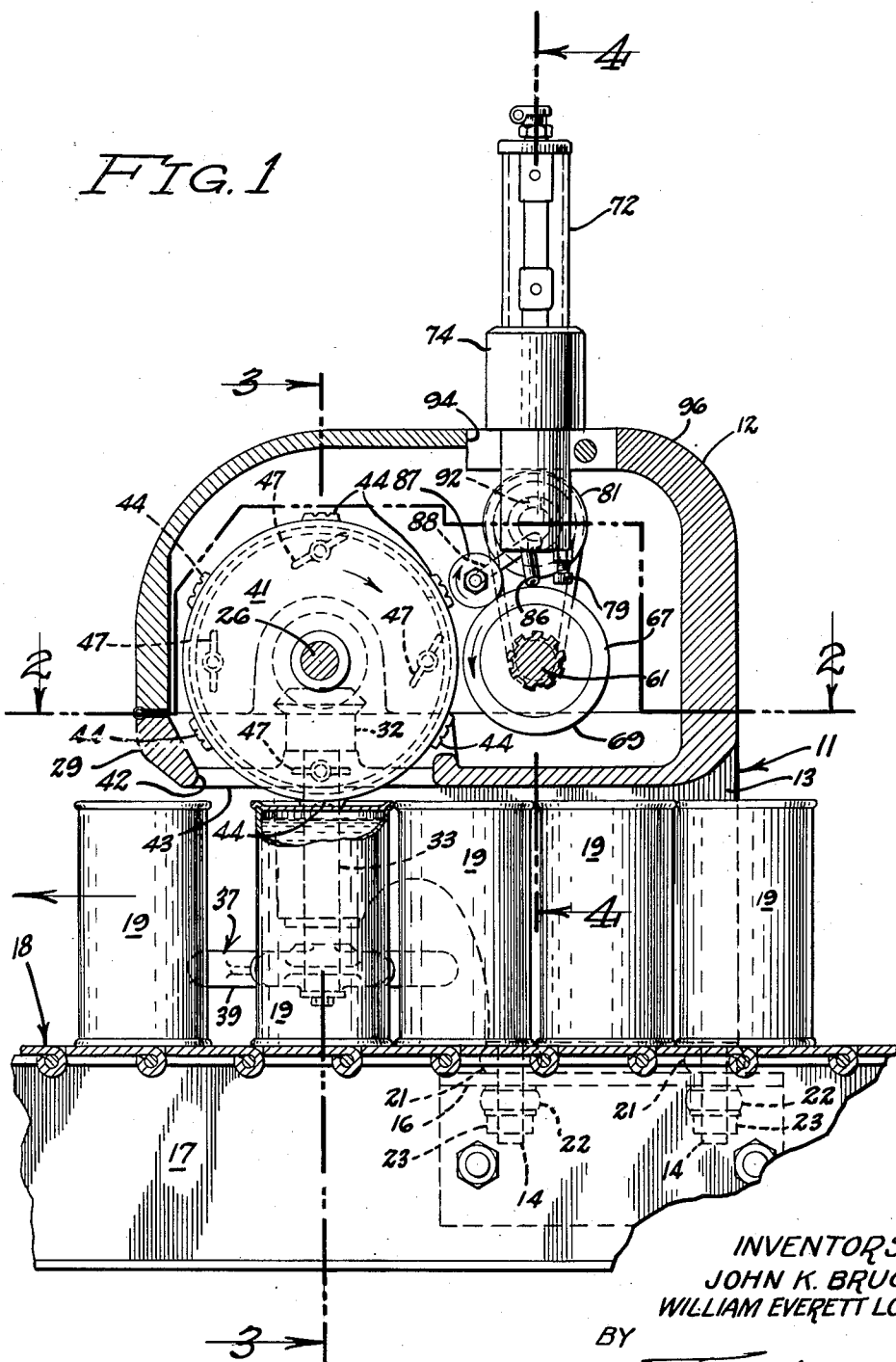
April 21, 1953

J. K. BRUCE ET AL
CAN MARKING MACHINE

2,635,531

Filed May 24, 1950

3 Sheets-Sheet 1



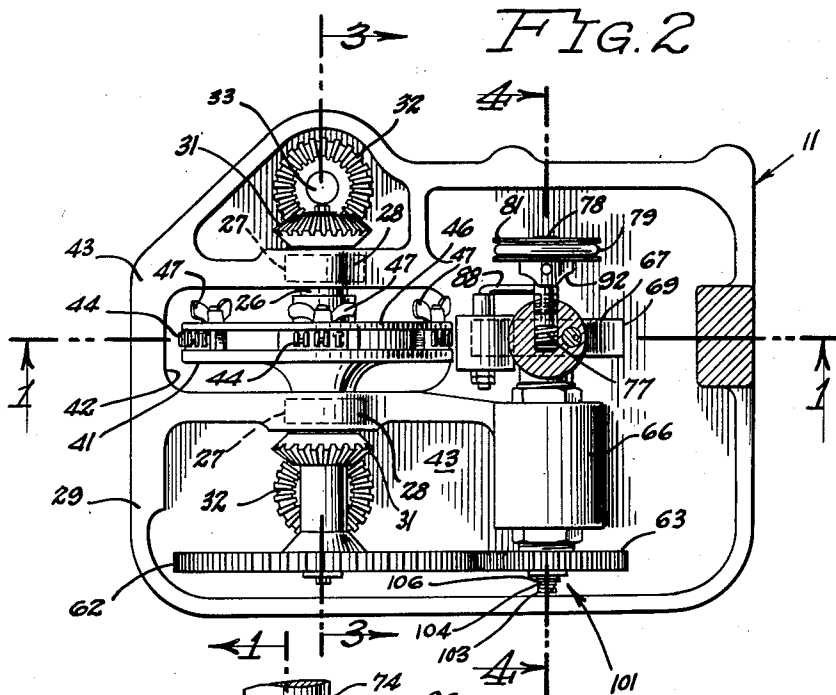
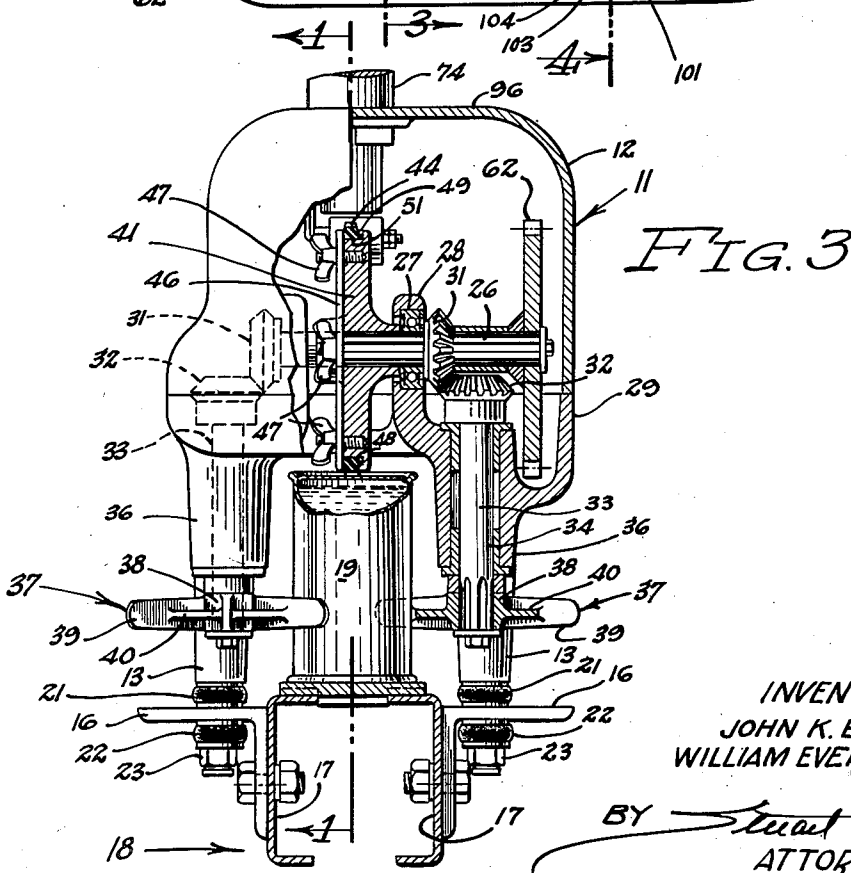
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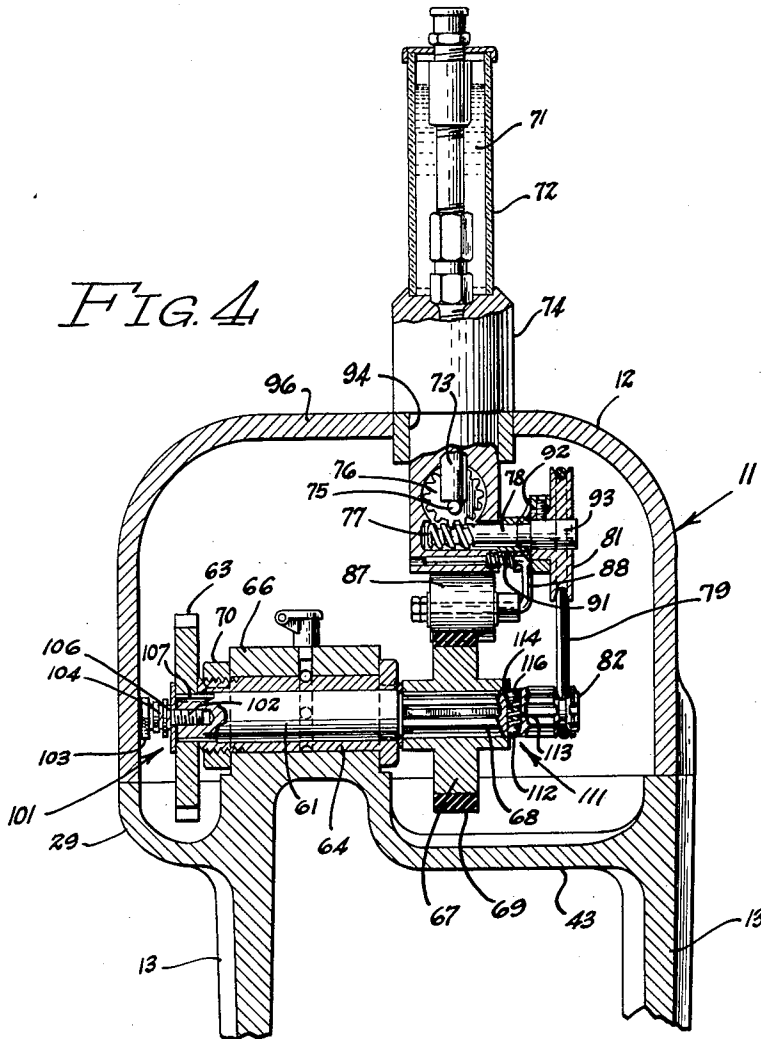
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UNITED STATES PATENT OFFICE

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CAN MARKING MACHINE

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11 Claims. (Cl. 101—35)

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This application relates to material handling equipment, and more particularly to machinery for handling canned goods.

In the canned beer industry it is common practice to apply code marking to the cans after filling and sealing and prior to the operation of placing the cans in cases. In fact, in some jurisdictions it is mandatory that each can of beer offered for sale shall have marked thereon a notice, either in code or otherwise, from which the date on which the beer was sealed within the can is ascertainable. In view of the tremendously high rate at which filled and sealed cans of beer are handled in a modern beer canning plant, the matter of affixing the requisite marking to each can heretofore has necessitated the installation and operation of special equipment of a complicated, cumbersome and expensive nature which has required almost constant supervision and frequent servicing and repair by trained personnel, and yet in actual commercial practice has not proven itself to be adequately dependable as far as its applying easily legible markings to each can is concerned.

The present invention provides a can marking machine of such a highly simplified nature that it is capable of substantially eliminating the so-called "down-time" of canning production lines heretofore necessitated by can marking equipment of more common design.

The can marking machine is adapted for use in conjunction with a conveyor of a standard production line deriving its motivating force from the cans themselves as they move along the conveyor, rather than from an independent motor, thus not only resulting in appreciable savings in equipment, but also increasing the overall efficiency of its operation. The operation of the marking machine and of the ink supplying apparatus which it includes is automatically maintained at a rate which is proportional to the rate at which cans are supplied to the machine by the associated conveyor, and operation of the machine ceases entirely when the flow of cans stops. This is one of the factors contributing to the saving in ink which alone is sufficient to more than compensate for the total cost of the machine within a single year of normal operation.

The invention comprises can marking apparatus for marking the top surfaces of vertically disposed cans traveling on a horizontal conveyor and including a housing, support means depending from the housing and adapted to attachment to the conveyor framework on opposite sides of

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the conveyor, a separate vertical shaft journaled through the housing and depending therefrom adjacent each side of the conveyor, a separate star wheel mounted on each shaft above the conveyor, each star wheel having a like number of radial arms adapted to successively project into the path of cans traveling on the conveyor whereby such can travel causes simultaneous and corresponding rotation of both star wheels, a driven shaft mounted in the housing to rotate on a horizontal axis, means driving the driven shaft responsive to rotation of the vertical shafts, and a printing wheel mounted to rotate with the driven shaft and to project below the housing in position to bear against the top face of cans passing beneath the housing.

Referring to the drawings:

Figure 1 is a longitudinal, vertical sectional view taken through a can marking machine incorporating the principles of the present invention. The plane of section is indicated by the line 1—1 of Figure 2 and the direction of view by the arrows.

Figure 2 is a horizontal sectional view, the plane of section being indicated by the line 2—2 of Figure 1 and the direction of view by the arrows.

Figure 3 is a view in end elevation, partly broken away and shown in transverse, vertical section on a plane indicated by the lines 3—3 of Figures 1 and 2 and the direction of view by the arrows.

Figure 4 is a transverse, vertical sectional view, the plane of section being indicated by the line 4—4 of each of Figures 1 and 2 and the direction of view by the arrows.

Specifically describing that embodiment of our invention which has been chosen for illustration and description herein, our improved and simplified marking machine is operably mounted within a frame indicated in its entirety at 11 and comprising an upper housing section 12 and a pair of supporting legs 13. These legs are spaced apart and preferably are arranged in opposed relation with their vertical axes in a plane which extends transversely of the machine. Rigidly secured to and extending downwardly from each of the legs 13 is a threaded stud 14 adapted to extend through a horizontal flange 16 which is rigid with and which extends preferably outwardly from the associated side member 17 of a conveyor 18 along which the cans 19 to be marked advance during one phase of the operation of their being sealed and prepared for shipment.

Thus it may be seen that means are provided

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for facile mounting of the marking machine upon the conveyor 18 with the legs 13 straddling the conveyor and with the housing portion 12 disposed above and extending athwart the conveyor so that as the cans 19 travel along the conveyor 18 they pass between the legs 13 below the housing 12. Preferably, in order to impart a substantial degree of flexibility of the entire marking machine with respect to the conveyor, a resilient washer or annular pad 21 is inserted upon each stud 14 between the lower end of the associated leg 13 and the upper face of the flange 16; and a similar cushion member 22 is interposed between the lower face of each flange 16 and the nut 23 threaded upon the associated stud 14 so that when the nuts 23 are tightened the entire machine is securely mounted upon the conveyor 18 without, however, that degree of rigidity that might be apt to damage either the cans 19 or portions of the machine in the event of jamming of the cans as they pass through the machine or passage of a can of unusual size through the machine.

Extending transversely of the machine within the upper housing portion 12 is a driven shaft 26 which is journaled as by suitable anti-friction bearings 27 within suitable pillars or web portions 28 rigid and preferably integral with the lower or base portion 29 of the housing 12. A pair of spaced bevel gears 31 rigid with the shaft 26 respectively enmesh bevel gears 32 each of which is rigidly secured upon the upper end of a vertical drive shaft 33 journaled as by bushings 34 in a downwardly extending tubular extension 36 of the housing's base 29. The two vertical drive shafts 33 also are in opposed relation, with their axes lying in a common transverse plane with the result that star wheels 37, one of which is rigidly secured to the lower end of each drive shaft 33, are arranged directly opposite each other on opposite sides of the path traversed by cans 19 as the cans pass along the conveyor 18. Each of these star wheels 37 comprises a hub 38 and preferably six spokes 39 extending radially therefrom, the spokes preferably being of flat blade-like configuration and reinforced by webs 40. They are so proportioned that their blades extend into the path traversed by the cans 19 with the result that as the cans pass through the space below the housing 12 they successively engage the star wheels and impart rotation thereto, turning the shafts 33 and thereby imparting rotary motion to the driven shaft 26. There being two opposed star wheels 37 both of which are engaged simultaneously by each can 19, lateral shifting of the can as it engages the star wheels and consequent avoidance of its actually turning the star wheels is precluded; and since there are six spokes 39 on each star wheel 37, as one can passes through the space between the star wheels, carrying with it one spoke of each star wheel, the next successive spoke of each star wheel will, before that can moves out of engagement with the spokes which it is pushing, be turned into the path immediately in front of the next successive can 19, with the result that positive assurance is provided that the star wheels and their associated shafts 33 will turn through one-sixth ($\frac{1}{6}$) of a revolution each time a can 19 passes through the machine. Moreover, since the ratio of the bevel gears 31 to the bevel gears 32 is 1:1, the driven shaft 26 also will be turned through a like angular distance as the result of passage of each can through the machine.

Carried by the driven shaft 26 for rotation

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therewith is a marking wheel 41 of such dimensions that its radius is slightly less than the distance between the axis of the shaft 26 and the path traversed by the tops of the cans 19 as they pass. Hence, the lower peripheral portion of the marking wheel 41 extends downwards through an opening 42 in the bottom 43 of the housing's base 29, enabling marking type 44 carried peripherally upon the wheel 41 to engage the tops of the cans and imprint thereupon characters corresponding to the nature of the face of the type 44. The type 44 are interchangeable, being removably secured to the peripheral edge of the wheel 41 through the expedient of a clamping disk 46 removably attached to one face of the wheel as by wing head screws 47 passing through the disk 46 and threaded into the wheel 41. The disk 46 engages one side of the type 44 to retain an angularly extending flange 48 within a complementary lateral extension 49 of the peripheral groove 51 of the wheel 41. Since the driven shaft 26 and the marking wheel 41 carried thereby rotate through one-sixth ($\frac{1}{6}$) of a turn as the result of passage of each can 19, the type 44 are arranged in groups which are spaced sixty degrees (60°) apart about the periphery of the wheel and in such position that when a can 19 is directly centered below the axis of the shaft 26, one of the groups of type will be in engagement with the top of that can at or closely adjacent its center. It is also of interest to note that the parts are so proportioned and arranged that the peripheral speed of the marking wheel 41 corresponds with the linear speed of the cans 19 as they move along the conveyor, thus making for sharp, highly legible characters imprinted upon the tops of the cans rather than characters of a blurred or smudged nature which would result from any difference in these speeds.

Means are provided for inking the type 44; and the inking means, as well as the marking wheel 41, receives its motivating energy directly from the cans 19 as the result of their impingement against and rotation of the star wheels 37. Also mounted within the housing 12, extending transversely thereof, is a countershaft 61 operably connected to the driven shaft 26 to be rotated simultaneously therewith through the expedient of a driving gear 62 rigid with the shaft 26 and enmeshed with a driven gear 63 rigid with the countershaft 61. The countershaft 61 is journaled in a bushing 64 carried by a pillar 66 upstanding from the bottom 43 of the housing's base 29. Preferably beyond the pillar 66 from its gear 63 the countershaft 61 carries an ink transfer roll 67 preferably splined thereto as indicated at 68. The surface of this ink transfer roll 67 is preferably in the form of a relatively thick resilient tire 69 adapted to apply ink evenly to the face of the type 44 inasmuch as the parts are so proportioned that the type 44 engage the periphery of the tire 69 as they are carried past the transfer roll 67 as the consequence of rotation of the marking wheel 41.

Means are also provided for adjusting the countershaft 61 radially so as to vary the distance between the periphery of the ink transfer roll 67 and the marking wheel 41 and thereby assuring that the transfer roll 67 bears with the optimum pressure against the face of the type 44 and thus is enabled to apply the proper quantity of ink to the type. Toward this end, the bushing 64 whereby the countershaft 61 is journaled in the pillar 66 is eccentrically bored and fits the pillar with sufficient looseness to permit the bushing to turn with respect thereto, and thus at-

tain the desired adjustment of the countershaft 61 toward or away from the marking wheel 41. A jamb nut 70 threaded on the end of the bushing 64 opposite its head, when tightened against the associated face of the pillar 66, releasably locks the bushing in selected position of adjustment.

Ink is supplied to the surface of the transfer roll 67 at a rate which is proportional to the rate at which cans pass through the machine inasmuch as the ink supplying mechanism also is driven by the countershaft 61 which, as herein above explained, receives the motivating force causing it to turn, directly from the cans as they pass through the machine. Because of this proportionality, the supply of ink is increased if and when the rate of passage of cans through the machine is increased, and conversely is decreased simultaneously and proportionally with decrease of the rate of can passage and to the extent that when any interruption in passage of cans through the machine occurs, supplying of ink to the transfer roll ceases altogether. Thus is attained a saving in ink, as compared to the ink consumption in can marking machines of more conventional designs, of very substantial commercial importance. The rate of discharge of the liquid ink 71 from its storage reservoir 72 is determined by the frequency of reciprocation of a plunger 73 carried by the housing 74 of the inking mechanism and extending from within the reservoir 72 downwards so that its lower end is engageable by a pin 75 eccentrically mounted upon and extending laterally from a worm wheel 76 operably engaged by a worm 77 which is carried by a shaft 78 rotated proportionally with rotation of the countershaft 61 through the expedient of a belt 79 engaged upon a driven pulley 81 carried by the shaft 78 and a drive pulley 82 carried by the countershaft 61. As the plunger 73 reciprocates, ink 71 is discharged from the reservoir 72 through a discharge nozzle 85 (see Figure 1) onto the surface of the transfer roll 67. A spreader roll 87 is journaled upon a bracket 88 pivotally mounted in the lower end of the housing 74 and is urged by gravity to turn in such a manner that the spreader roll 87 presses against the surface of the transfer roll 67 between the point at which the ink drips onto the transfer roll and the point at which contact occurs between the transfer roll 67 and the type 44. A spring 91 encircling the pivotal end of the bracket 88 urges the bracket 88 and the spreader roll 87 carried thereby to move in an axial direction, pressing the bracket 88 against a cam 92 which is carried by the same shaft 93 as that which carries the worm 77. The effect of such engagement between the bracket 88 and the cam 92 is to cause the bracket and its spreader roll 87 to move back and forth across the surface of the transfer roll 67 and thereby make for greater efficiency in spreading the ink evenly over the surface of the transfer roll 67, thus further effecting ink economy.

Inasmuch as the housing 74 of the inking mechanism extends upwardly through an opening 94 in the top 96 of the housing 12, and since the reservoir 72, which is of transparent material, is mounted at the upper end of the housing 74 exteriorly of the top 96, the quantity of ink 71 remaining within the reservoir 72 is instantly observable at all times.

Under normal conditions of operation, the cans being marked move through the marking machine at a relatively high rate of speed (it is not

unusual for the cans to travel at the rate of three or four per second). Hence, it is desirable to provide means for developing some degree of frictional resistance to the rotation of the star wheels and the other movable parts of the machine operably coupled thereto. This is for the purpose of preventing the possibility that the star wheels might, by the momentum of the movable parts, be caused to rotate faster than appropriate to the rate of movement of the cans, as, for example, when a sudden interruption occurs in the rate at which cans are fed along the conveyor 18 to the marking machine. In the absence of such a frictional resistance, the star wheels might, after flow of cans to the machine decelerates or ceases, assume such a position that the next time a can does reach them, that can will strike the ends of the spokes then presented to the can, rather than the lateral faces of the spokes, and then, instead of imparting rotation to the star wheels and passing easily therebetween, jam the conveyor. To provide against such an occurrence, a friction drag indicated in its entirety at 101 (see Figures 2 and 4) is provided. It comprises a screw 102, preferably having a knurled head 103 to facilitate its adjustment without tools. The screw is threaded into the end of the countershaft 61, with preferably both a flat washer 104 and a spring washer 106 between its head 103 and the outer face of the gear 63. The connection between the gear 63 and the countershaft being a spline 107, tightening the screw 102 presses the inner face of the gear 63 more tightly against the end of the bushing 64 in which the countershaft 61 is journaled, thereby increasing the frictional resistance, not only to movement of the countershaft 61 and the gear 63, but of all of the movable parts operably coupled thereto, including the star wheel 37.

Another detail of construction which should be mentioned here affords convenience in servicing the transfer roll 67. The preferred means for retaining the transfer roll 67 against axial movement on the countershaft 61 is a detent 111 in the form of a ball 112 extending partially through the restricted end of a diametral hole 113 in the countershaft 61. A spring 114 under compression between the ball 112 and a plug 116 threaded into the opposite end of the hole 113 yieldably retain the ball in that position, exteriorly of the countershaft 61, which enables it to engage an end of the hub of the transfer roll 67 to avoid accidental axial movement of the transfer roll 67. But when disassembly is desired, all that is required is that the transfer roll 67 be forced to the right as viewed on Figure 4, and the wedging action developed when the exposed portion of the ball 111 forceably engages the hub of the roll 67, will result in forcing the ball 111 back into the hole 113 against the action of the spring 114, whereupon the transfer roll 67 can readily be removed from its supporting shaft, thus permitting inspection, cleansing, or repair.

We claim:

1. Can marking apparatus for marking the top surfaces of vertically disposed cans traveling on a horizontal conveyor comprising a frame, a pair of drive shafts journaled therein in spaced apart relation, a star-wheel on each of said drive shafts engageable by a can in moving between said shafts for turning said shafts, means for mounting said frame with said shafts extending vertically on opposite sides of the path of cans to be marked and with one of the spokes of each of said star-wheels lying in said path, a driven-shaft

journaled in said frame in position offset from and extending athwart said path, means connecting said driven shaft to each of said drive shafts to be rotated thereby, a wheel carried by said driven shaft with its periphery disposed closely adjacent the position occupied by the surface of a can to which marking is to be applied when said can is in engagement with said star-wheels, and marking means mounted on the periphery of said wheel.

2. In a machine for marking the tops of cans as they advance in a vertical position along a horizontal conveyor, a frame comprising a housing and a pair of supporting legs extending downwardly therefrom in spaced apart relation, means for mounting said marking machine upon said conveyor with said flanges rigid with and extending horizontally from the sides of said conveyor in position to receive and support said legs with said housing above and extending athwart said conveyor, a pair of shafts journaled in and extending vertically downwards from said housing in position straddling said conveyor, a star wheel carried by each of said shafts and comprising a hub and spokes extending radially therefrom, at least one of said spokes of each of said star wheels extending into the path traversed by cans in moving along said conveyor whereby both of said star wheels are motivated by said can to impart rotary motion to said shafts, a driven shaft journaled within said housing, means coupling said driven shaft to said vertical shafts to be rotated thereby, a marking wheel carried by said driven shaft with the lower peripheral portion thereof extending downwards through the bottom of said housing to a position closely adjacent the path traversed by the tops of cans moving along said conveyor, type mounted on the periphery of said marking wheel, means for inking said type comprising a countershaft journaled within said housing, means connecting said countershaft to said driven shaft for rotation simultaneously therewith including a driving gear carried by said driven shaft and a driven gear splined to said countershaft, a transfer roll carried by said countershaft in position for its peripheral surface to engage type means for supplying ink to the surface of said transfer roll, and a variable frictional drag comprising a screw threaded into one end of said countershaft with its head exposed beyond the outer face of said driven gear, and a spring washer encircling the shank of said gear and interposed between said screw's head and said gear and pressing said gear against the portion of said housing in which said countershaft is journaled.

3. Can marking apparatus for marking the upper exposed end surfaces of vertically disposed cans traveling on a horizontal conveyor comprising a housing, support members depending from the housing on opposite sides of the conveyor and adapted to be affixed to the conveyor framework for supporting the housing above the conveyor, a pair of vertical shafts journaled through the housing and depending therefrom on either side of the conveyor, a separate star wheel mounted on each shaft above the conveyor with the two star wheels having a like number of radial arms adapted to successively project into the path of cans traveling on the conveyor whereby such can travel causes simultaneous and corresponding rotation of both star wheels, a driven shaft mounted in the housing to rotate on a horizontal axis, means driving the driven shaft responsive to rotation of the two vertical shafts, and a printing

wheel mounted to rotate with the driven shaft and to project below the housing in position to bear against the top face of cans passing beneath the housing.

4. Can marking apparatus for marking the upper exposed end surfaces of vertically disposed cans traveling on a horizontal conveyor comprising a housing, support members depending from the housing on opposite sides of the conveyor, resilient mounting means attaching the support members non-rigidly to the conveyor framework for supporting the housing above the conveyor, a pair of vertical shafts journaled through the housing and depending therefrom on either side of the conveyor, a separate star wheel mounted on each shaft above the conveyor with the two star wheels having a like number of radial arms adapted to successively project into the path of cans traveling on the conveyor whereby such can travel causes simultaneous and corresponding rotation of both star wheels, a driven shaft mounted in the housing to rotate on a horizontal axis, means driving the driven shaft responsive to rotation of the two vertical shafts, and a printing wheel mounted to rotate with the driven shaft and to project below the housing in position to bear against the top face of cans passing beneath the housing.

5. Apparatus according to claim 4 wherein said resilient mounting means comprises resilient cushion members interposed between the support members and the conveyor framework.

6. Can marking apparatus for marking the upper exposed end surfaces of vertically disposed cans traveling on a horizontal conveyor comprising a housing, support members depending from the housing on opposite sides of the conveyor and adapted to be affixed to the conveyor framework for supporting the housing above the conveyor, a pair of vertical shafts journaled through the housing and depending therefrom on either side of the conveyor, a separate star wheel mounted on each shaft above the conveyor with the two star wheels being equidistant above the conveyor and having a like number of radial arms adapted to successively project into the path of cans traveling on the conveyor whereby such can travel causes simultaneous and corresponding rotation of both star wheels, a driven shaft mounted in the housing to rotate on a horizontal axis, means driving the driven shaft responsive to rotation of the two vertical shafts, and a printing wheel mounted to rotate with the driven shaft and to project below the housing in position to bear against the top face of cans passing beneath the housing.

7. Can marking apparatus for marking the upper exposed end surfaces of vertically disposed cans traveling on a horizontal conveyor comprising a housing, support members depending from the housing on opposite sides of the conveyor and adapted to be affixed to the conveyor framework for supporting the housing above the conveyor, a pair of vertical shafts journaled through the housing and depending therefrom on either side of the conveyor, a separate star wheel mounted on each shaft above the conveyor with the two star wheels having a like number of radial arms adapted to successively project into the path of cans traveling on the conveyor whereby such can travel causes simultaneous and corresponding rotation of both star wheels, a driven shaft mounted in the housing to rotate on a horizontal axis, means driving the driven shaft responsive to rotation of the two vertical shafts, a printing wheel mounted to rotate with the driven shaft

and to project below the housing in position to bear against the top face of cans passing beneath the housing, and inking means for supplying ink to the printing wheel.

8. Can marking apparatus for marking the upper exposed end surfaces of vertically disposed cans traveling on a horizontal conveyor comprising a housing, support members depending from the housing on opposite sides of the conveyor and adapted to be affixed to the conveyor framework for supporting the housing above the conveyor, a pair of vertical shafts journaled through the housing and depending therefrom on either side of the conveyor, a separate star wheel mounted on each shaft above the conveyor with the two star wheels having a like number of radial arms adapted to successively project into the path of cans traveling on the conveyor whereby such can travel causes simultaneous and corresponding rotation of both star wheels, a driven shaft mounted in the housing to rotate on a horizontal axis, means driving the driven shaft responsive to rotation of the two vertical shafts, a printing wheel mounted to rotate with the driven shaft and to project below the housing in position to bear against the top face of cans passing beneath the housing, inking means for supplying ink to the printing wheel, and means operable responsive to rotation of the star wheels to actuate said inking means and to apply ink to the printing wheel in amounts proportionate to the angular velocity of the star wheels.

9. Apparatus according to claim 6 wherein said printing wheel comprises a wheel having a continuous annular peripheral groove bottomed adjacent one face of the wheel and opening toward the opposite face, the groove being adapted to receive protruding flanges on type arranged on the circumference of the wheel, and a clamping plate affixed to said opposite face of the wheel and removably locking type in said groove-engaging position.

10. Apparatus according to claim 8 wherein said inking means and means operable responsive to rotation of the star wheels to actuate the said inking means comprises an ink reservoir, a countershaft journaled in the housing, means driving the countershaft responsive to rotation of the star wheels and at a proportionate rate, flow control means operably connected to control

ink flow from the reservoir, and means operable responsive to rotation of the countershaft and sensible to the rate of rotation thereof to actuate the flow control means.

11. Can marking apparatus for marking the upper exposed end surfaces of vertically disposed cans traveling on a horizontal conveyor comprising a housing, support means depending from the housing on opposite sides of the conveyor, resilient mounting means for attaching the support members non-rigidly to the conveyor framework where by the housing is suspended above and across the conveyor, a separate vertical shaft journaled through the housing and depending therefrom adjacent each side of the conveyor, a separate star wheel mounted on each shaft above the conveyor with the two star wheels being equidistant above the conveyor and having a like number of radial arms adapted to successively project into the path of cans traveling on the conveyor whereby such can travel causes simultaneous and corresponding rotation of both star wheels, a driven shaft mounted in the housing to rotate on a horizontal axis, means driving the driven shaft responsive to rotation of the two vertical shafts and at the same rate of rotation, a printing wheel mounted to rotate with the driven shaft and to project below the housing in position to bear against the top face of cans passing beneath the housing, inking means for supplying ink to printing means carried on the periphery of the printing wheel and means operable responsive to rotation of the star wheels to actuate said inking means and to cause ink to flow to the printing wheel in amounts proportionate to the angular velocity of the star wheels.

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