

March 21, 1967

F. C. WORTH

3,309,986

APPARATUS FOR MARKING CYLINDRICAL ARTICLES

Filed May 28, 1964

2 Sheets--Sheet 1

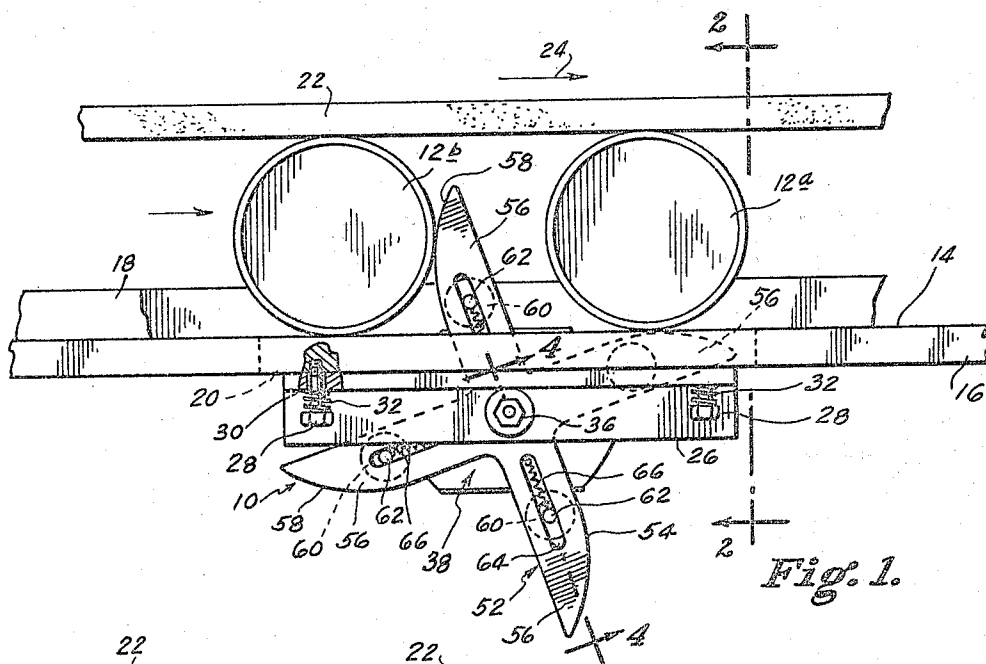


Fig. 1.

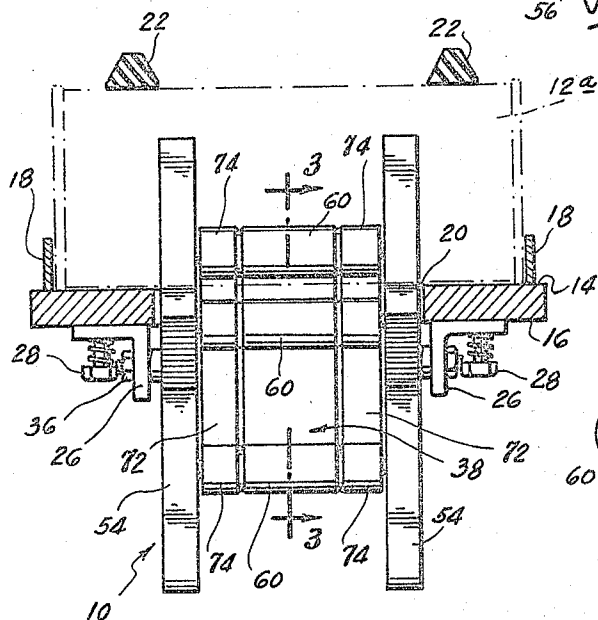


Fig. 2.

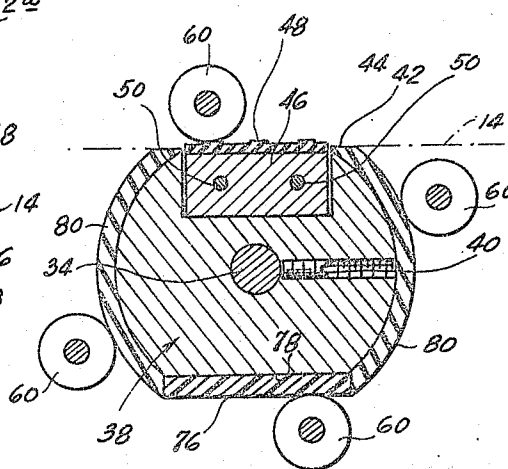


Fig. 3.

INVENTOR.

FRANCIS C. WORTH

BY

Ernest Montgomery
ATTORNEY

ATTORNEY

March 21, 1967

F. C. WORTH

3,309,986

APPARATUS FOR MARKING CYLINDRICAL ARTICLES

Filed May 28, 1964

2 Sheets-Sheet 2

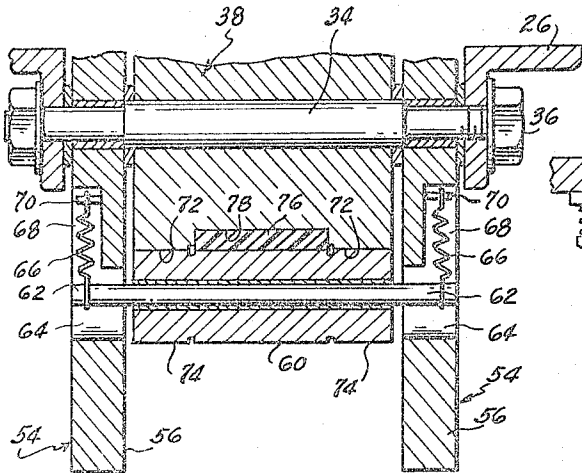


Fig. 4.

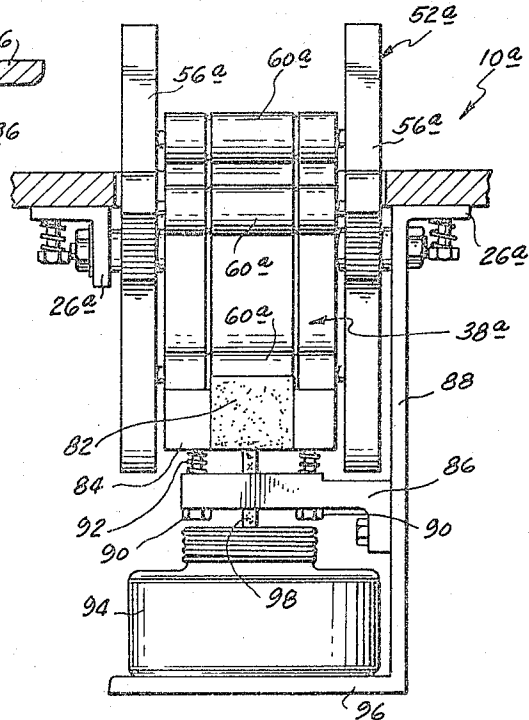


Fig. 6.

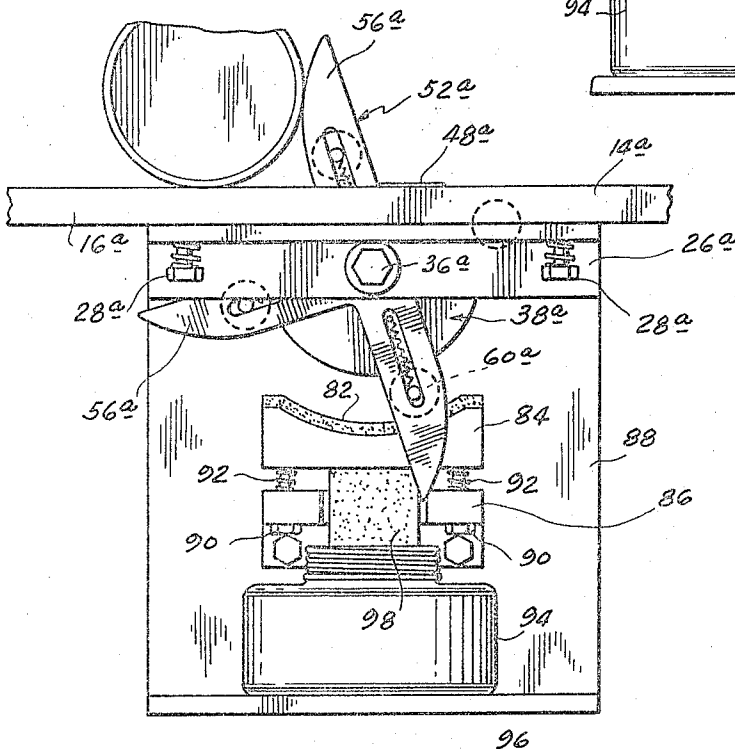


Fig. 5.

INVENTOR.

FRANCIS C. WORTH

BY

Jeff. Montgomery
ATTORNEY

1

3,309,986

APPARATUS FOR MARKING CYLINDRICAL ARTICLES

Francis C. Worth, Ridgewood, N.Y., assignor to Adolph Gottscho, Inc., Hillside, N.J., a corporation of New York

Filed May 28, 1964, Ser. No. 371,046

13 Claims. (Cl. 101—39)

This invention relates generally to apparatus for applying markings or patterns of ink or other liquids to the surfaces of cylindrical articles, such as, cans and the like.

The need frequently arises to apply inked impressions, such as, code marks, or patterns of other liquids, such as, adhesive, to the surfaces of cans or other cylindrical articles as such articles roll along horizontal, inclined, or vertical conveyor surfaces. Such a need particularly arises, for example, in the case of cans being conveyed from a labeling machine where wrap-around labels are applied to the can and it is desired to provide a code mark, preferably in the form of an inked impression, to the label extending around each can. Existing apparatus for effecting the marking of cans and the like usually includes a rotatable marking or die wheel carrying one or more marking elements on its periphery and being turned either by a positive drive or by frictional engagement with the articles to be marked so that the marking element effects rolling and marking contact with the surface of each of the successive conveyed articles. Further, such existing apparatus includes an inking system in the form of an inking roller turnable about a stationary axis and applying ink to the raised surfaces of the marking element or elements upon rotation of the die wheel, and a relocating or returning mechanism operative, upon disengagement of the die wheel from an article which has been marked, to return the die wheel to its initial position in preparation for the marking of the next article on the conveyor.

The above described existing apparatus is disadvantageous in that, whether rotation of the die wheel is effected by frictional engagement with the conveyed article or positively by independent means, difficulty is experienced in ensuring that, at the moment of marking contact, the peripheral speed of the marking element on the die wheel will be exactly equal to the speed of movement at the surface of the article which is being marked, thereby to avoid blurring of the impression applied to the article. Further, the necessity of providing the apparatus with a relocating or other mechanism for ensuring that the die wheel will be positioned for marking contact with each of the successive conveyed articles tends to complicate the structure, and thereby increase the cost and possibility of mechanical failure of the apparatus.

Accordingly, it is an object of this invention to provide an apparatus of relatively simple construction which is operative to mark cylindrical articles with impressions of ink or other liquids as such articles roll along a horizontal, inclined or vertical conveyor surface.

A further object is to provide an apparatus of the described character which is driven or operated by the cylindrical article rolling along a conveyor surface, and wherein the parts of the apparatus actually moved by the conveyed article are of relatively small combined mass so as to avoid appreciable interference with the travel of the cylindrical articles.

In accordance with an aspect of this invention, an apparatus for applying impressions of ink or other liquids to successive cylindrical articles rolling along a conveyor surface comprises a die element having an operative or raised surface with a configuration conforming to that of the desired impression to be applied and being supported with its operative surface substantially co-planar

2

with the conveyor surface so that, as each article rolls along the conveyor surface past the die element, the article effects rolling contact with the operative surface of the die element, a plurality of spaced apart, rotatable transfer rollers mounted for movement along a closed path having a portion extending past the die element so that, as each roller moves along such portion of the closed path, the roller effects rolling contact with the operative surface of the die element, a liquid supplying member extending along another portion of the closed path remote from the first mentioned portion for rolling engagement by each transfer roller as the latter moves along such other portion of the closed path, thereby to apply liquid to the roller, and means effecting the movement of the rollers along the closed path in synchronism with the rolling of the cylindrical articles along the conveyor surface so that each article passing the die element is preceded by a roller which transfers to the operative surface liquid previously received from the liquid supplying member for application, by the die element, to the cylindrical article which next rolls past the die element.

In a preferred embodiment of the invention, the die element is carried by a stationary body mounted adjacent the conveyor surface so that the operative surface of the die element projects through an opening in the conveyor surface for rolling engagement by the successive cylindrical articles, and the means for effecting the movement of the transfer rollers along the closed path is constituted by a star wheel rotatable about an axis extending through the body carrying the die element and having radial arms dimensioned to project through the opening of the conveyor surface for driving engagement by the successive cylindrical articles rolling along the conveyor surface. Further, in such preferred embodiment, the transfer rollers are rotatably supported by the arms of the star wheel and yieldably urged radially inward with respect to the axis of the latter so as to roll on the circumference of the body which thereby defines the configuration of the closed path followed by the transfer rollers.

In one advantageous embodiment of the invention, the means for supplying ink or other liquid to the transfer rollers includes a pad also carried by the body which supports the die element and formed of a micro-porous, micro-reticulated thermoplastic resin impregnated with ink or other liquid. In another practical construction embodying the invention, the means for supplying ink includes a porous pad extending along the related portion of the closed path of the transfer rollers, but arranged at the outside of such closed path, a reservoir containing a supply of ink or other liquid and a wick extending upwardly from the reservoir and connected to the porous pad for conducting ink or other liquid to the latter.

The above and other objects, features and advantages of the invention, will be apparent in the following detailed description of illustrative embodiments thereof which is to be read in connection with the accompanying drawings forming a part hereof, and wherein:

FIG. 1 is a side elevational view of an apparatus in accordance with one embodiment of this invention for applying inked, or other liquid impressions to successive cylindrical articles rolling along a conveyor surface;

FIG. 2 is a sectional view taken along the line 2—2 on FIG. 1;

FIG. 3 is a sectional view taken along the line 3—3 on FIG. 2, but on an enlarged scale;

FIG. 4 is a detail sectional view taken along the line 4—4 on FIG. 1, but on an enlarged scale;

FIG. 5 is a side elevational view similar to that of FIG. 1, but showing another embodiment of this invention; and

3

FIG. 6 is a view similar to that of FIG. 2, but showing the embodiment illustrated by FIG. 5.

Referring to the drawings in detail, and initially to FIGS. 1 and 2 thereof, it will be seen that an apparatus embodying this invention and generally identified by the reference numeral 10 is there shown employed for the purpose of applying impressions of a liquid substance, for example, inked markings, to successive cans or other cylindrical articles 12a, 12b, etc. as such articles roll along a conveyor surface 14. The conveyor surface 14 may be defined by an elongated plate or pair of rails 16 with longitudinal fences 18 at the sides for guiding the successive articles, and having an opening 20, at least at the location where the rolling articles are to be marked or imprinted by the apparatus 10.

The conveyor surface 14 along which the cylindrical articles roll during marking or imprinting by the apparatus 10 may be horizontal, as shown, or inclined or vertical. Particularly when the surface 14 is steeply inclined or vertical, the successive cans or cylindrical articles are held securely against the conveyor surface by means of conveyor belts 22 running around suitable pulleys (not shown) so as to have runs extending parallel to surface 14 and engaging the tops of the cans or cylindrical articles. When the conveyor surface 14 is horizontal, as shown, the belts 22 can be suitably driven, for example, in the direction of the arrow 24 on FIG. 1, for the purpose of effecting the desired rolling movement of the cans or other cylindrical articles along the conveyor surface.

The illustrated apparatus 10 embodying this invention includes a supporting structure made up of a pair of elongated angle members 26 extending along the opposite sides of opening 20 at the bottom of the elongated plate 16, that is, at the side of the plate 16 opposed to the conveyor surface 14. Each of the angle members 26 is supported from the plate 16 by means of bolts 28 extending loosely through holes 30 in the horizontal, laterally outwardly directed flange or leg of the member 26 adjacent the ends of the latter, and being screwed into tapped bores in plate 16. Compression springs 32 are provided on the bolts 28 between the heads of the latter and the laterally directed flanges of members 26 for yieldably urging the latter against plate 16. An axle 34 (FIG. 4) extends laterally between angle members 26 and has threaded ends secured, as by nuts 36, in holes formed centrally in the vertical legs of the angle members.

A generally cylindrical body 38 is secured, as by a set screw 40 (FIG. 3), on the axle 34 so as to extend into the opening 20. The portion of body 38 extending into opening 20 is flattened, as at 42, and formed with a recess 44 which receives a block 46 carrying a rubber marking or die element 48. The block 46 with its marking element 48 is secured in recess 44 by suitable means, for example, by set screws 50 extending through body 38 into the recess 44. The various parts are dimensioned so that, when angle members 26 engage the underside of plate 16, as shown, the flat or planar raised surface of the die element 48 is parallel to the plane of the conveyor surface 14 and slightly above the latter, as shown on FIG. 3. Thus, as each of the successive cans or cylindrical articles 12a, 12b, etc., rolls along conveyor surface 14 over opening 20, the surface of the can effects rolling contact with the raised or operative surface of the type element 48 and pushes the latter more or less toward the plane of the conveyor surface 14 against the force of springs 32 to ensure uniform contact of the die element with each of the successive cans.

The apparatus 10 further comprises a star wheel 52 made up of two side members 54 rotatably mounted on axle 34 at the opposite sides of the body 38. The side members 54 have laterally aligned or paired arms 56 extending radially outward with respect to the axis of rotation of the star wheel and dimensioned so that the ends of the arms 56 move along a circular path extending

4

through the opening 20 and projecting substantially into the path of rolling movement of the cans or articles 12a, 12b, etc., along the conveyor surface 14. The arms 56 of each side member 54 are equally angularly spaced from each other and are preferably at least four in number, as shown. Thus, each of the cans or cylindrical articles rolling along conveyor surface 14 over body 38 engages a laterally aligned pair of the arms 56 projecting beyond the conveyor surface and drives such arms before it so as to turn star wheel 52 through an angle of approximately 90°. As one pair of laterally aligned arms 56 is moved to a position below the plane of conveyor surface 14 by the action of a can engaged therewith, for example, the can 12a on FIG. 1, the next pair of arms 56 projects beyond conveyor surface 14 substantially at right angles thereto, and thus is positioned for driving engagement by the next can 12b without the possibility that the successive cans will cause jamming of the star wheel.

As shown on FIG. 1, the edges of the arms 56 which are engaged by the successive cans or cylindrical articles during driving by the latter of the star wheel 52 may be arcuate, as at 58, so that, at the instant of initial contact of a can with the arms 56, a plane tangent to the points of contact will extend approximately perpendicular to the conveyor surface 14, and thereby most effectively convert the movement of the cans along the conveyor surface into rotation of the star wheel.

In order to apply a liquid, for example ink, to the operative or raised surface of die element 10, the apparatus 10 further comprises a plurality of transfer rollers 60 extending laterally between the aligned or paired arms 56 of star wheel 52 for movement along a closed path around the body 38 in response to rotation of the star wheel. Each transfer roller 60 is freely rotatable on a shaft 62 having end portions slidable in radially elongated slots 64 formed in the arms 56. Tension springs 66 are received in grooves 68 extending radially inward from slots 64 and have their opposite ends connected to the end portions of the related shaft 62 and to anchor pins 70 secured in the inner end portions of groove 68. Thus, the transfer rollers 60 are movable radially with respect to the axis of rotation of star wheel 52 and are urged radially inward by the springs 66 to ride on the circumference of body 38 which thereby defines the configuration of the closed path followed by the transfer rollers during rotation of the star wheel.

The body 38 is preferably formed with circumferential or peripheral bearer rims 72 adjacent its opposite sides, and the transfer rollers 60 are formed with end portions 74 engageable with the bearer rims 72 so as to effect rotation of the transfer rollers 60 about their shaft 62 upon movement of the transfer rollers along the closed path extending around body 38. It should be noted that the die element 48 is located between bearer rims 72 which, at the flat portion 42 of the body 38, are provided with similarly flat or straight sections. Thus, as each transfer roller 60 rolls along the straight sections of bearer rims 72 appearing at the top of body 38 in the illustrated arrangement, the transfer roller 60 effects rolling contact with the raised or operative surface of die element 48.

In accordance with this invention, ink or other liquid is supplied to each of the transfer rollers 60 as the roller moves along a portion of the closed path remote from the die element 48. In the apparatus 10, the ink or other liquid supplying means is constituted by a pad 76 of a plastic resin having a micro-porous, micro-reticulated structure impregnated with ink or other liquid, for example, as disclosed in detail in U.S. Letters Patent No. 2,777,824, issued Jan. 15, 1957, to Harry R. Leeds. The ink impregnated pad 76 is disposed in a recess 78 provided in body 38 between bearer rims 72 at a portion of the body which is substantially diametrically opposed to the location of die element 48. If desired, the pad 76 can be substantially flat, as shown, in which case, the sections of the bearer rims 72 extending along the pad 76 are also

5

straight or flat so that the rollers 60 moving along such sections of the bearer rims will effect rolling contact with pad 76 and thereby pick up ink from the latter.

If desired, the circumferential sections of the body 38 extending from pad 76 to die element 48 may be recessed between the bearer rims 72 and have rubber or other elastic strips 80 cemented thereon, as shown on FIG. 3, to act as metering or ink distributing surfaces.

The above described apparatus 10 operates as follows:

The successive cans or other cylindrical articles rolling along conveyor surface 14 engage the laterally paired arms 56 of star wheel 52 to effect rotation of the latter. During such rotation of the star wheel, each of transfer rollers 60 rolls along the ink impregnated pad 76 and thus has ink applied to its surface. As the transfer roller 60 continues its movement around body 38 in the clockwise direction, as viewed on FIGS. 1 and 3, the surface of the transfer roller having ink applied thereto rolls along the surface of the rubber strip 80 which thereby serves to meter or effect uniform distribution of the ink on the surface of the transfer roller 60. Thereafter, the transfer roller 60 rolls across the raised or operative surface of the die element 48 for inking the latter. It will be seen that each can or cylindrical article rolling over die element 48 and simultaneously driving a laterally aligned pair of arms 56 is immediately preceded across the die element by the transfer roller 60 carried by the driven arms so that the die element 48 is freshly inked just before each rolling contact of a can or cylindrical article therewith, thereby ensuring clear and sharp imprints on each can. At the conclusion of each marking operation, the transfer roller 60 which inked the die element for that marking operation continues around body 38 and again rolls across pad 76 for receiving ink from the latter.

Since the die element 48 is stationary and each of the cans or cylindrical articles merely rolls across or over the die element for receiving an inked impression from the latter, the possibility of relative movement of the surface of the die element and the surface of the can or cylindrical article at the instant of marking does not arise, as contrasted with the situation where the die element is carried by a rotatable die wheel which has to be driven at a peripheral speed equal to the speed of movement of the article being marked. The fact that the die element 48 is stationary has the additional advantage of eliminating the need for return or repositioning mechanism, as the die element is always properly located for marking of a can rolling thereover. Further, although the marking apparatus 10 is operated by the successive cans or articles rolling along conveyor surface 14, it will be apparent that only the star wheel 52 is made to move by the driving action of the successive cans, and that the mass of the star wheel may be relatively small so as to interpose a minimum resistance to the movement of the cans or cylindrical articles along the conveyor surface.

Referring now to FIGS. 5 and 6, it will be seen that the apparatus embodying this invention, which is there generally identified by the reference numeral 10a, is similar to the previously described apparatus 10 and has its several parts identified by the same reference numerals, but with the letter a appended thereto. In fact, the apparatus 10a differs from the apparatus 10 only with respect to the arrangement provided therein for applying ink or other liquid to each of the transfer rollers 60a during movement of the latter along a portion of the closed path around the body 38a which is remote from the location of the die element.

In the apparatus 10a, a porous pad 82 of felt or the like is mounted on a block 84 which is shaped so that the pad 82 will extend parallel to the path of travel of transfer rollers 60a during the application of ink or other liquid to the latter. The block 84 is mounted, for example, as hereinafter described in detail, so that the porous pad 82 is arranged along the outside of the path

6

of travel of transfer rollers 60a. The mounting for the block 84 may include a bracket 86 extending laterally from a plate 88 which depends from one of the angle members 26a. Bolts 90 extend loosely through suitable holes in the bracket 86 and are screwed into tapped bores opening at the bottom of block 84, and compression springs 92 are arranged on bolts 90 between brackets 86 and block 84 to urge the latter upwardly to the extent permitted by the engagement of the heads of bolts 90 with the bottom surface of bracket 86. Thus, springs 92 act to urge pad 82 against the successive rollers 60a.

In order to supply ink to the pad 82, apparatus 10a has a reservoir 94 containing a supply of ink, and which is suitably supported, for example, on the shelf 96 extending from the bottom of plate 88, so that the opening of reservoir 94 is at the top of the latter. A wick 98 extends upwardly from reservoir 94 through suitable openings in bracket 86 and block 84 and is connected to the porous pad 82 for conducting ink or other liquid from reservoir 94 to the pad 82. Since the wick 98 is flexible, the reservoir 94 can always be mounted on a horizontal support surface so as to avoid spilling of ink therefrom, even when the apparatus 10a is associated with an inclined or vertically extending conveyor surface.

As shown particularly on FIG. 5, the portion of body 38a which is arranged opposite pad 82 may be arcuate, in which case the pad is also arcuate, or the pad 82 may be substantially straight or flat, in which case the corresponding portion of body 38a is also flat.

The operation of the apparatus 10a is generally similar to that of the apparatus 10 in that each roller 60a receives ink from the pad 82 while moving past the latter, and then inks the operative or raised surface of the die element 48a immediately before the rolling contact of a can or other cylindrical article with the die element.

Although illustrative embodiments of this invention have been described in detail herein with reference to the accompanying drawing, it is to be understood that the invention is not limited to those precise embodiments, and that various changes and modifications may be effected therein by one skilled in the art without departing from the scope or spirit of the invention, except as defined in the appended claims.

What is claimed is:

1. An apparatus for applying impressions of a liquid substance to successive cylindrical articles rolling along a straight path, said apparatus comprising a body carrying a die element having a planar operative surface with a configuration conforming to that of the impressions to be applied, means supporting said body adjacent said straight path with said operative surface of the die element being disposed substantially co-planar with said straight path so that, as each article rolls past said body, the article effects rolling contact with said operative surface, a star wheel member rotatable about an axis extending through said body and having radial arms dimensioned to project into said straight path, thereby to be driven by the successive articles rolling along the latter, a plurality of transfer rollers each rotatably carried by an arm of said star wheel member to move with the latter along a closed path extending around said body and having a portion at which rollers of the plurality of transfer rollers successively effect rolling contact with said operative surface of the die element, and a liquid supplying member extending along another portion of said closed path remote from the first mentioned portion and at which the rollers successively effect rolling contact with, and receive liquid from said liquid supplying member, whereby each transfer roller sequentially receives liquid from said supplying member and transfers the liquid to said operative surface for application by the latter to an article passing said body and driving the star wheel member.

2. An apparatus as in claim 1; wherein said liquid supplying member includes a porous pad impregnated with the liquid and also carried by said body.

7

3. An apparatus as in claim 1; wherein said liquid supplying member is constituted by a porous pad arranged at the outside of said closed path along said other portion of the latter; and further comprising a reservoir containing a supply of the liquid, and a wick member extending upwardly from said reservoir and connected to said porous pad for conducting liquid to the latter from said supply.

4. An apparatus for applying inked markings to cylindrical articles rolling along a straight path, said apparatus comprising a body carrying a die element having a planar operative surface with a configuration conforming to that of the impressions to be applied, means supporting said body adjacent said straight path with said operative surface of the die element being disposed substantially co-planar with said straight path so that, as each article rolls past said body, the article effects rolling contact with said operative surface, a star wheel member rotatable about an axis extending through said body and having radial arms dimensioned to project into said straight path, thereby to be driven by the successive articles rolling along the latter, a transfer roller rotatably carried by each of said arms of the star wheel member and extending parallel with the axis of rotation of the latter to move with the star wheel member along a closed path which extends around said body and conforms to the circumferential shape of the latter so that the articles effecting rolling contact with said operative surface of the die element and driving said arms of the star wheel member are preceded across said die element by transfer rollers also making rolling contact with said operative surface, and ink supplying means extending along said closed path at a portion of the latter remote from said die element so that each transfer roller moving along said portion of the closed path receives ink from said supplying means for transfer to said operative surface prior to rolling contact of an article with the latter.

5. An apparatus as in claim 4; wherein each of said transfer rollers is mounted for limited radial movement with respect to said axis of the star wheel member; and is provided with spring means urging it radially inward, and wherein bearer rims are provided on the sides of said body engageable by said rollers under the action of said spring means to define the configuration of said closed path.

6. An apparatus as in claim 5; wherein said bearer rims are substantially flat at the regions thereof extending along said die element.

7. An apparatus as in claim 6; wherein said bearer rims are also flat at the sections thereof corresponding to said portion of the closed path along which the ink supplying means extends.

8. An apparatus as in claim 7; wherein said ink supplying means includes a flat pad of micro-porous, micro-reticulated pad of thermoplastic resin impregnated with ink and situated between said bearer rims on said body.

9. An apparatus as in claim 6; wherein said ink supplying means includes a porous pad extending along said portion of the closed path and spaced outwardly from said body so that the transfer rollers pass between the latter and said porous pad and are held in contact with the pad by said bearer rims, a reservoir containing a supply of ink, and a wick extending upwardly from said reservoir and being connected to said pad for conducting ink to the latter.

10. An apparatus for applying inked impressions to cylindrical articles as the latter roll past an opening in a straight conveyor surface, said apparatus comprising a support structure mounted adjacent said opening and being yieldably urged in the direction toward said con-

8

veyor surface, a star wheel rotatably mounted in said support structure and including laterally spaced side members having paired angularly spaced, radial arms dimensioned to project through said opening for driving engagement by the articles rolling past the opening, a stationary body mounted on said support structure between said side members of the star wheel and carrying a die element with raised surface portions lying in a flat plane and projecting through said opening for rolling contact by the cylindrical articles, said body including bearer rims extending circumferentially therearound at opposite sides of said die element and having straight portions extending along the die element, said paired arms of the star wheel having radial slots therein, an ink transfer roller for each pair of arms of the star wheel, said roller having a shaft on which it is rotatable, the ends of said shaft being slidable in said slots of the related pair of arms so that each roller is movable radially with respect to the axis of the star wheel, spring means urging each roller radially inward against said bearer rims of said body so that said rollers move along a closed path around said body in response to turning of the star wheel, and ink supplying means extending along a portion of said closed path remote from said die element and applying ink to each roller moving along said portion of the closed path so that, as each pair of arms is driven by a cylindrical article, the latter is preceded past said die element by the transfer roller carried by that pair of arms and which applies ink to said raised surface portions of the die element.

11. Apparatus as in claim 10; wherein said ink supplying means includes a pad of micro-porous, micro-reticulated thermoplastic resin impregnated with ink and also mounted on said body between said bearer rims.

12. Apparatus as in claim 11; wherein said pad is flat and said bearer rims further have flat portions extending along said pad.

13. Apparatus as in claim 10; wherein said ink supplying means includes a porous pad mounted at the outside of said closed path and being resiliently urged toward the latter for contact by said rollers rolling therepast, a reservoir containing a supply of ink, and a wick projecting upwardly from said reservoir and being connected to said pad for conducting ink to the latter.

References Cited by the Examiner

UNITED STATES PATENTS

595,653	12/1897	Robinson	101—212 X
2,027,102	1/1936	Hommel et al.	101—40 X
2,427,765	9/1947	Chollar	101—327
2,442,948	6/1948	Bogoslowsky	101—39 X
2,492,709	12/1949	Pannier	101—39
3,072,044	1/1963	Jones	101—35

FOREIGN PATENTS

873,178	1/1958	Great Britain.
---------	--------	----------------

References Cited by the Applicant

UNITED STATES PATENTS

810,979	1/1906	Richards.
985,479	2/1911	Waller.
1,080,504	12/1913	Vary.
2,015,669	10/1935	Gravely et al.
2,624,274	1/1953	Harvey.
2,635,533	4/1953	Stewart.
2,696,781	12/1954	Hunt.

ROBERT E. PULFREY, *Primary Examiner.*

PAUL R. WOODS, *Assistant Examiner.*