

Dec. 31, 1957

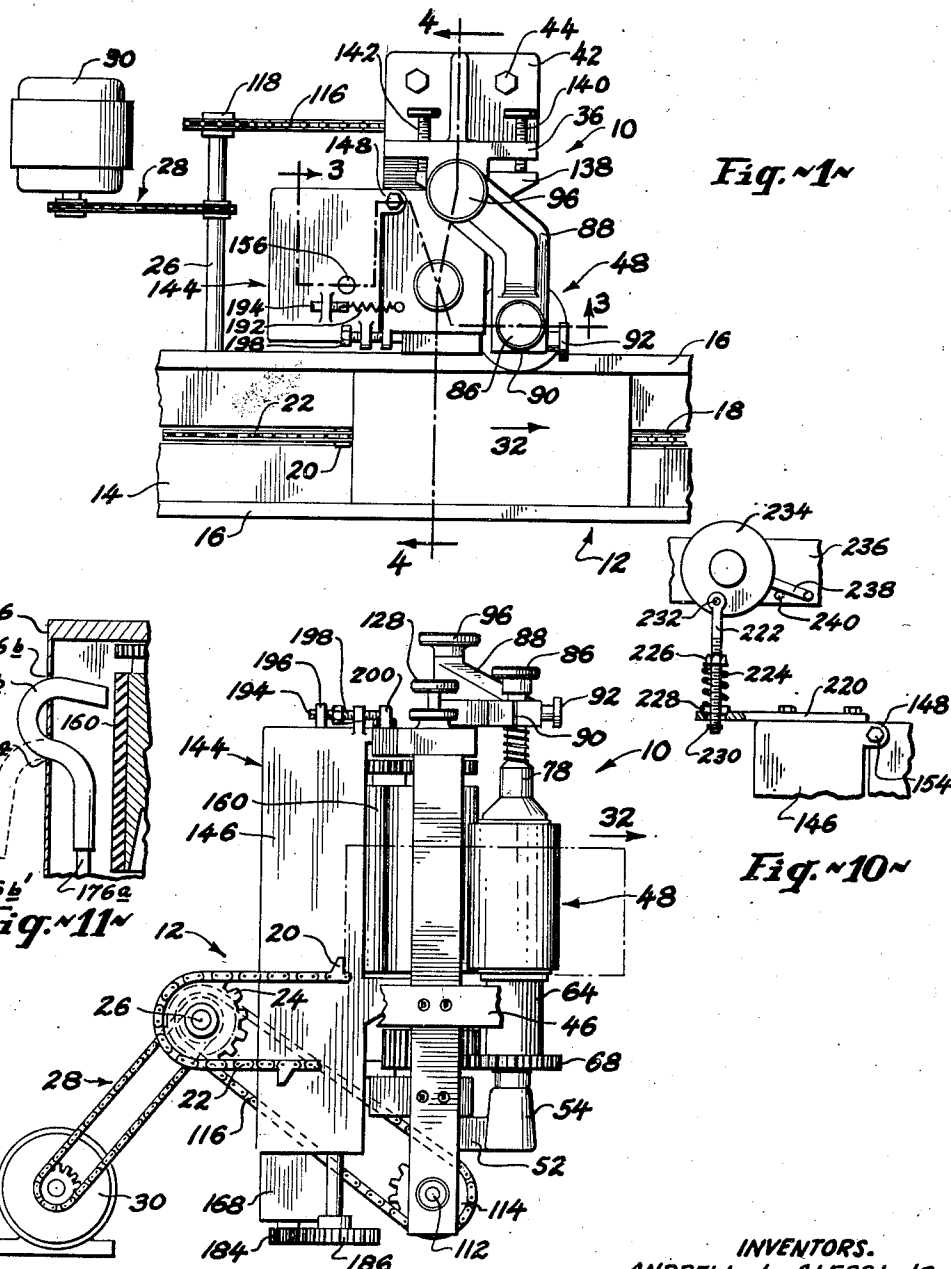
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2,818,016

MARKING APPARATUS

Filed March 18, 1954

4 Sheets-Sheet 1



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4 Sheets-Sheet 2

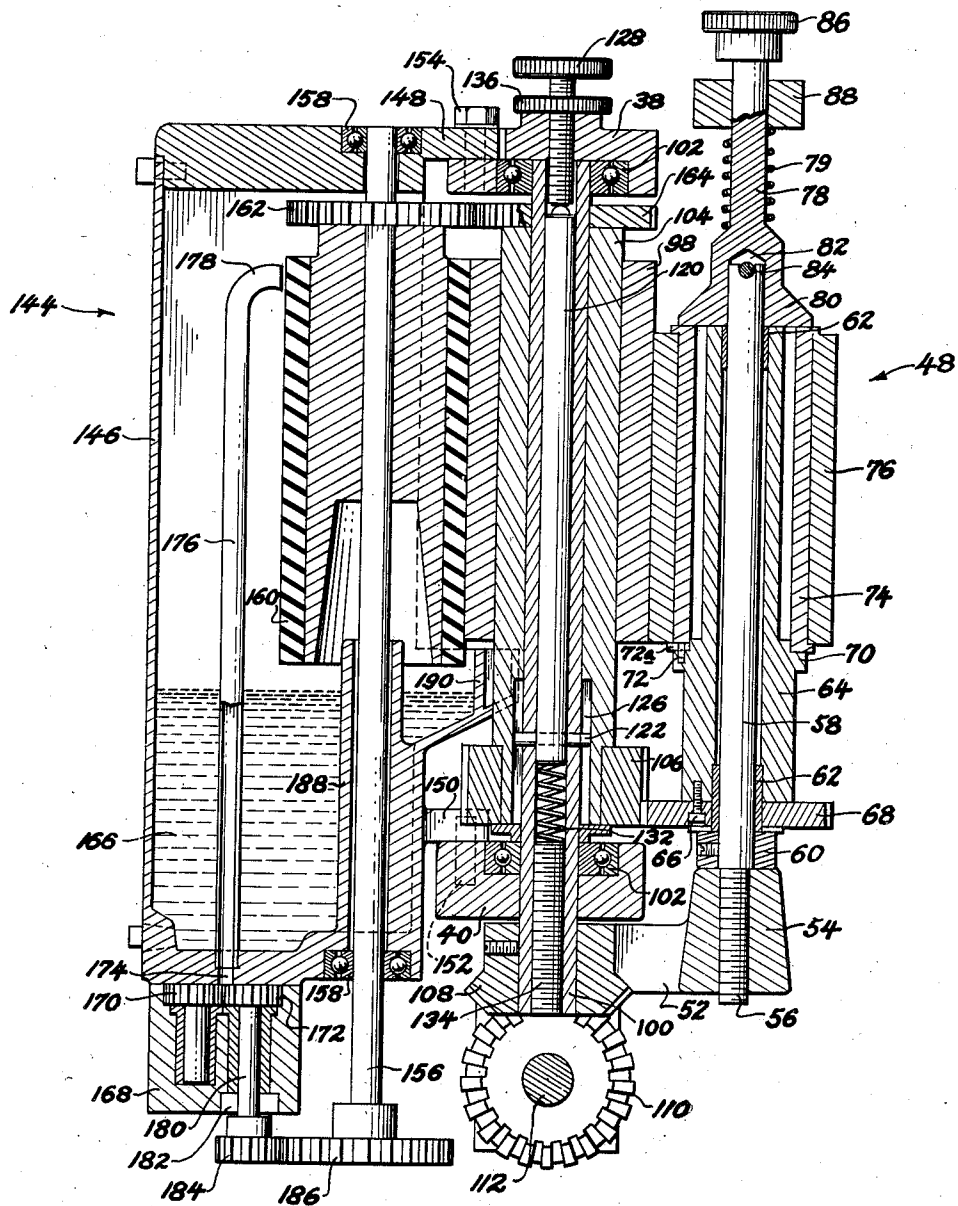
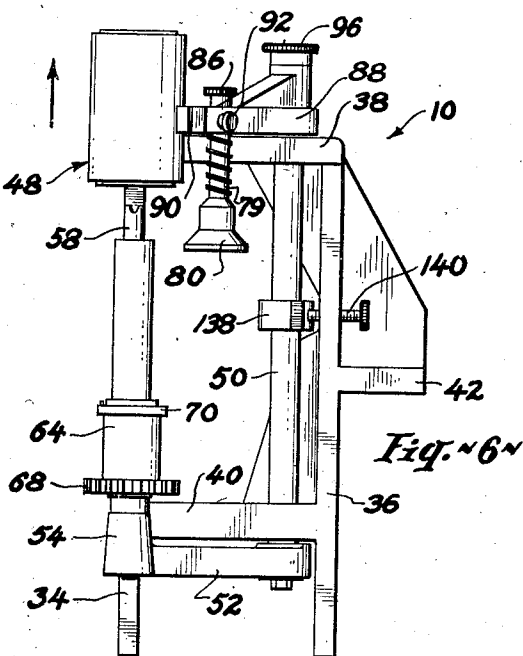
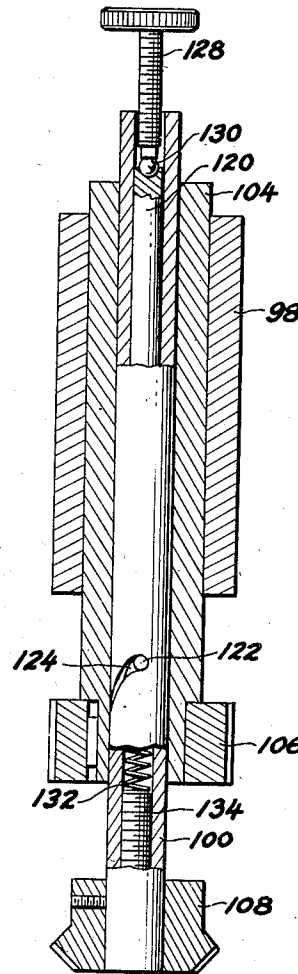
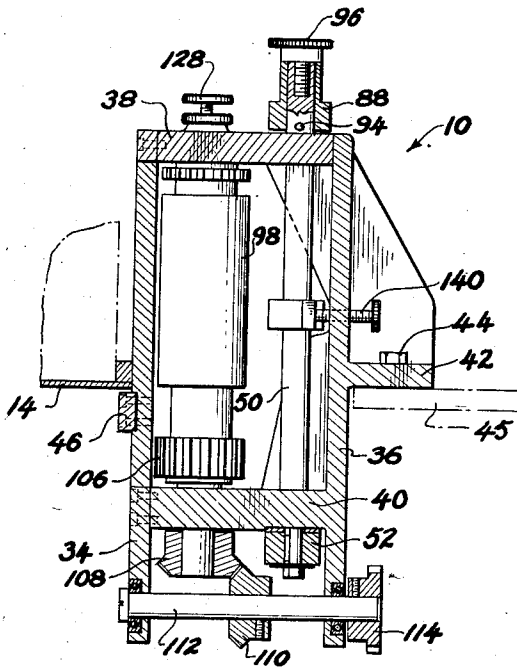


Fig. 3

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4 Sheets-Sheet 3



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4 Sheets-Sheet 4

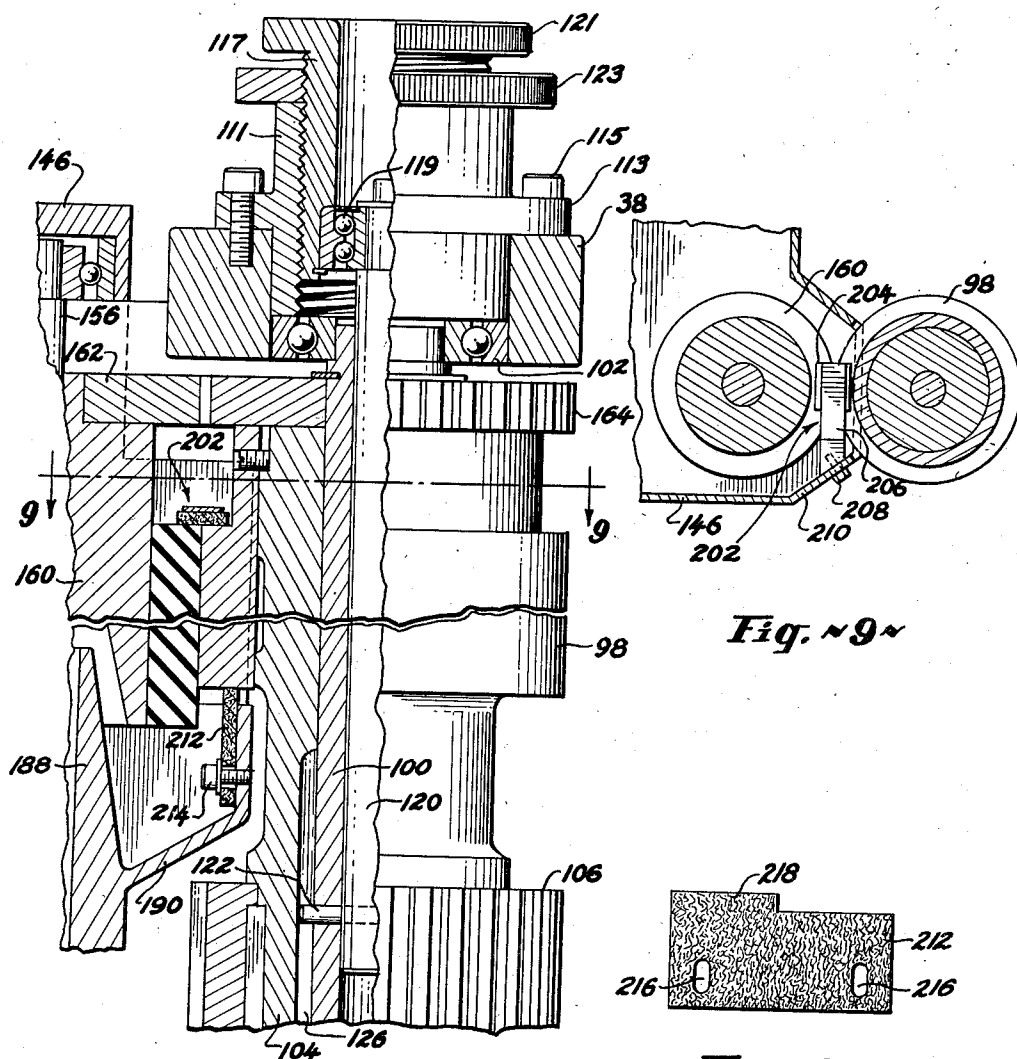


Fig. 7~

Fig. 9~

Fig. 8~

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MARKING APPARATUS

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Application March 18, 1954, Serial No. 417,062

15 Claims. (Cl. 101—35)

The present invention relates generally to marking apparatus, and is particularly directed to improvements in apparatus for applying inked impressions to successive articles moving along a conveyor.

Specifically, the improvements embodying the present invention are incorporated in a marking apparatus which is disposable at either side of a horizontal conveyor path and includes a die or marking wheel supported for rotation about a vertical axis in a position effecting rolling and marking contact with the side surfaces of the successive conveyed articles, cartons, boxes and the like, as the latter move past that position or marking station. The apparatus includes an arrangement for effecting rotation of the marking or die wheel in synchronism with the movement of the articles along the related conveyor to avoid relative movement of the marking wheel and article during marking of the latter, and a system for applying ink to the raised or etched marking elements mounted on the periphery of the marking wheel.

A general object of the invention is to provide marking apparatus of the described character which is sturdier, less difficult to produce and maintain, and more adaptable to different conditions than existing marking apparatus.

More specifically, an object of the present invention is to provide marking apparatus of the described character wherein the die or marking wheel is supported at both the top and bottom thereof to eliminate the necessity of including a heavy and accurately machined supporting structure for maintaining parallelism between the axes of the die or marking wheel and the metering roll of the ink supplying system.

Another object is to provide an arrangement for driving the die or marking wheel which dispenses with the customary compound gears and eliminates the noise of operation associated with the latter.

Another object is to provide marking apparatus of the described character wherein the die or marking wheel is in the form of a hollow and inexpensive shell which can be conveniently removed from its supporting structure to decrease the cost of maintaining a supply of spare marking wheels whereby different legends may be provided in advance on spare marking wheels for ready substitution.

Another object is to provide means in marking apparatus of the described character for effecting vertically axial movement of the die or marking wheel, while the apparatus is in operation or at rest, to provide for adjustment of the level or vertical location of the inked marking or impression applied to the side surfaces of the successive conveyed articles.

Another object is to provide marking apparatus of the described character in the form of a compact and self-contained printing head which includes an easily replaceable component embodying an ink reservoir, pumping means and ink supplying roll for receiving the pumped ink and transferring the ink to the metering roll with

which it is normally in rolling contact so that the above mentioned component can be replaced when the color of the inked impression is changed to avoid the necessity of cleaning out a permanently installed ink supplying arrangement, as in the existing apparatus.

A further object is to provide an ink supplying system in a marking apparatus of the described character wherein the pumping means is driven from the associated conveyor through a transmission which is made up, at least in part, of the transmission driving the die or marking wheel to avoid the separate pump driving motors customarily used for that purpose in the existing apparatus, and wherein couplings or long hose connections are avoided in the ducts feeding ink from the pump and returning excess ink to the pump to eliminate the clogging of ink commonly experienced at such couplings and hose connections in the existing apparatus.

Still another object of the present invention is to provide means in marking apparatus of the described character for adjusting the location of the inked marking applied to the successive conveyed articles in the direction of movement of the latter without requiring any interruption in the operation of the apparatus.

A still further object is to provide marking apparatus of the described character which is constructed to accommodate marking or die wheels of different diameters so that the die wheel can be replaced at any time by one having the most desirable diameter in view of the character, for example, rigidity, of the articles being marked or the space between the successive articles on the associated conveyor.

In accordance with the invention, marking apparatus includes a frame for mounting adjacent one side or the other of the table over which the articles to be marked are conveyed. A vertical shaft is mounted in the frame and has arms extending radially from the upper and lower ends of the shaft to carry the structure for supporting the die or marking wheel. The supporting structure for the marking wheel includes a spindle threadably mounted at its lower end in the free end of the lower radial arm so that rotation of the spindle will effect vertical adjustment of the latter, and a driving sleeve rotatable on the spindle and movable vertically with the latter. The marking wheel is in the form of a sleeve fitting removably over the driving sleeve from above, and the upper radial arm carries a rotatable and axially movable socket for receiving the upper end of the spindle so that rotation of the socket produces the desired vertical adjustment of the spindle, driving sleeve and marking wheel.

The support for the metering roll of the ink supplying system includes a hollow vertical shaft journaled in bearings carried by the frame, with a suitable gear being affixed to its lower end to be driven from the associated conveyor. An axially fixed, but relatively rotatable sleeve is telescoped over the hollow shaft and has a wide gear fixed thereon at a level below the conveyor table which meshes with a relatively narrow gear fixed to the driving sleeve of the marking wheel and having a pitch diameter equal to the diameter of the marking wheel so that noisy compound gears are avoided and the gears retain their meshing engagement even during vertical adjustment of the marking wheel. The sleeve of the support for the metering roll has internal, axially extending grooves receiving the opposite ends of a pin passing through helical slots formed in the hollow shaft, and a plunger is reciprocable within the hollow shaft and secured to the pin for effecting vertical displacement of the latter in response to the manual actuation of adjusting means provided at the top of the frame. Thus, the sleeve can be angularly adjusted relative to the hollow shaft during the operation of the apparatus to register the markings with

respect to the articles on the conveyor in the direction of movement of the articles.

Further, a preferred embodiment of the invention employs manually actuatable adjusting means for reciprocating the above mentioned plunger of the marking register, wherein the adjusting means is constructed and arranged so that the same parts and assemblies can be used in marking apparatus disposed at opposite sides of the conveyor path.

The ink supplying system of apparatus embodying the invention includes a housing removably mounted as a unit upon the frame and incorporating a gear pump in the lower portion thereof below an ink reservoir, which is defined in the housing, and an ink supplying roll rotatable about a vertical axis for rolling contact with the metering roll when the housing is mounted on the frame. Meshing gears on the shaft of the ink supplying roll and on the hollow shaft of the metering roll are provided for rotating the ink supplying roll, and the gear pump is driven by a gear transmission from the shaft of the ink supplying roll. An ink delivering pipe extends upwardly within the housing from the outlet of the ink pump and discharges adjacent the upper portion of the surface of the ink supplying roll, and the housing includes a sump extending under the line of contact of the ink supplying and metering rolls to collect the excess ink which flows off the rolls at this point.

Marking apparatus embodying the present invention is preferably further characterized by wiper assemblies in contact with the upper ends of the ink supplying and metering rolls and with the lower end of the metering roll to prevent the build-up of ink on the contacted end surfaces, while the lower end of the ink supplying roll extends below the lower end of the metering roll into the sump structure so that the excess ink pours off the lower end of the ink supplying roll and radial scattering thereof is prevented by the side walls of the sump structure.

The foregoing, and other projects, features and advantages of the invention will be apparent in the following description of an illustrative embodiment when it is read in connection with the accompanying drawings forming a part hereof, and wherein:

Fig. 1 is a top plan view of marking apparatus embodying the present invention with only so much of an associated article conveyor being illustrated as is necessary to an understanding of the invention;

Fig. 2 is a side elevational view of the marking apparatus of Fig. 1, but with the associated conveyor being broken away to expose the constructional features of the marking apparatus;

Fig. 3 is a vertical sectional view of the apparatus taken along the line 3—3 of Fig. 1, but on an enlarged scale;

Fig. 4 is a vertical sectional view of the apparatus taken along the line 4—4 of Fig. 1;

Fig. 5 is a detailed elevational view, partly broken away and in section, of a portion of the assembly shown in Fig. 3 for registering the impression applied by the marking wheel;

Fig. 6 is an end elevational view of the marking apparatus embodying the invention, but with the parts disposed for removal and replacement of the marking wheel thereof;

Fig. 7 is an elevational view, partly broken away and in section, of the metering roll supporting structure and adjacent elements in another embodiment of the invention;

Fig. 8 is an elevational view of a lower wiping member included in the embodiment of Fig. 7;

Fig. 9 is a horizontal sectional view, taken along the line 9—9 of Fig. 7 but on a reduced scale;

Fig. 10 is a fragmentary top plan view of a further embodiment of the invention; and

Fig. 11 is a fragmentary vertical sectional view of an ink feeding pipe in still another embodiment of the invention.

Referring to the drawings in detail, and initially to Figs.

1 to 6, inclusive, thereof, marking apparatus embodying the present invention is there shown and generally identified by the reference numeral 10. Marking apparatus 10 is intended to mark one or the other of the side surfaces of each article in a succession of articles, cartons, boxes and the like, being advanced along a horizontal path past the marking apparatus by a suitable conveyor mechanism which is generally identified in Figs. 1 and 2 by the reference numeral 12. The conveyor mechanism 12 may, for example, include a horizontal table 14 (Fig. 1) having lateral guides 16 for the articles arranged along the opposite sides thereof and provided with at least one longitudinal slot 18 through which successive pushers 20 project upwardly while moving along the upper run of a related endless chain 22 carrying the pushers for engagement with the trailing ends of successive articles on the support surface or table 14. The chain 22 meshes with a driving sprocket 24 adjacent one end of table 14 and with an idler sprocket (not shown) adjacent the opposite end of the table. The driving sprocket 24 is mounted on a drive shaft 26 which is driven, for example, by a chain and sprocket transmission 28, from an electric motor 30. It is to be understood that the briefly described conveyor mechanism forms no part of the present invention, apart from its association with the marking apparatus 10, and that any suitable conveyor mechanism may be employed in place thereof for advancing the successive articles past the marking apparatus in the direction of the arrows 32 in Figs. 1 and 2.

The marking apparatus 10 includes a frame for mounting upon structural elements of the conveyor mechanism adjacent one side or the other of the table 14. The frame preferably includes two spaced apart vertical side members 34 and 36 (Fig. 4) which are joined by upper and lower cross-members 38 and 40, respectively. A flange 42 extends normal to side member 36 for mounting, as by bolts 44, on a suitable supporting plate 45, shown in broken lines on Fig. 4, which forms a part of the frame structure of the conveyor mechanism. The opposite side member 34, facing toward the path of travel of the articles, is preferably secured to a structural element of the conveyor mechanism below the level of the table 14, as at 46 (Figs. 2 and 4).

Marking apparatus 10 comprises a die or marking wheel, generally identified by the reference numeral 48 (Figs. 1, 2, 3 and 6), which is supported on the above described frame for rotation about a vertical axis by support structure including a vertical shaft 50 journaled at its upper and lower ends in the frame cross-members 38 and 40. A curved arm 52 extends radially from the lower end of shaft 50 and is fixed to the latter below the cross-member 40. At its free end, curved arm 52 is formed with a bush or head 54 having a vertical tapped bore extending therethrough to receive the lower threaded end 56 of a marking wheel spindle 58 (Fig. 3). A collar 60 is secured on spindle 58 immediately above threaded portion 56, and the spindle carries bushings 62 of anti-friction bearing material at locations above collar 60 and adjacent the upper end, respectively. A driving sleeve 64 is rotatably mounted on spindle 58 in contact with bushings 62 and, at its lower end, is secured, as at 66, to a relatively narrow spur gear 68 for rotation with the latter. The driving sleeve 64 is formed with an annular shoulder 70 defining an upwardly facing seat for supporting the lower end of the marking wheel 48 and having a coupling pin 72 projecting axially therefrom to be received in a selected one 72a of a series of angularly spaced apart radial grooves formed in the lower end of the marking wheel structure for providing a driving connection between the driving sleeve and the marking wheel thereon.

As seen in Fig. 3, the marking wheel 48 includes a cylindrical, open ended shell 74 formed to removably telescope over the sleeve 64 from above and to rest, at its lower end, against the shoulder 70, and a marking die,

element or elements 76 suitably secured, as by interlocking members (not shown), to the outer surface of the shell.

The upper end of spindle 58 projects from driving sleeve 64 and marking wheel 48 mounted thereon and is supported by a vertical plunger 78 having an enlarged head 80 at its lower end formed with a downwardly opening vertical bore 82 for receiving the upper end of the spindle. The head 80 has a pin 84 extending diametrically therein through the bore 82 to be received in a diametric, corresponding groove formed in the upper end surface of the spindle for providing a rotational coupling between plunger 78 and spindle 64. Plunger 78 is provided with a suitable knob 86 at its upper end for manual rotation thereof, and the plunger is rotatably and axially movable within a vertical bore formed adjacent the free end of a support arm 88 which extends radially from the upper end of shaft 50 above cross-member 38. As seen in Figs. 1, 2 and 6, the free end of arm 88 is longitudinally slotted, as at 90, to the bore accommodating plunger 78, and a clamping screw 92 extends laterally through the slotted end of the arm for clamping or releasing the plunger 78. The end of arm 88 mounted on shaft 50 is formed with an upstanding hollow boss which is rotatably and axially movable on the shaft, and the latter is provided with a diametrically extending pin 94 (Fig. 4) receivable in suitable downwardly opening notches (not shown) in the lower surface of arm 88 to align the arm 88 at the top of shaft 50 with the arm 52 extending radially from the lower end of that shaft so that the plunger 78 is then axially aligned with the spindle 58 to receive the upper end of the latter in the bore 82 of head 80. A clamping screw 96 having a suitable knob on the head end thereof is threaded axially into the upper end of shaft 50 to prevent upward movement of arm 88 and thereby to retain pin 94 in the corresponding notches of that arm.

From the foregoing, it is apparent that the marking wheel 48 is rotatably supported at the top and bottom thereof to avoid the need for a heavy and accurately machined support member as is usually required when the marking wheel is supported either at the top or at the bottom thereof, as in existing marking apparatus. Further, when it is desired to adjust the vertical location of the inked markings applied to the successive articles, the clamping screw 92 is loosened to permit rotation and vertical movement of the plunger 78. Then, plunger 78 is rotated, in one direction or the other, with such rotation being communicated to spindle 58 by engagement of pin 84 in the corresponding notch of the spindle. When the spindle is rotated, the threaded lower end 56 screws into or out of the head 54 of the lower arm 52 to effect vertical movement of the spindle and with it, of the marking wheel 48. When the marking wheel has been vertically adjusted to its desired location, the clamping screw 92 is again tightened to prevent further rotation or vertical movement of the plunger 78 and of the spindle 58.

When the marking wheel 48 is to be removed for replacement by another marking wheel, for example, when changing the imprint or the color of the ink, the clamping screw 92 is loosened and the plunger 78 is raised until the head 80 is clear of the upper end of spindle 58. Then clamping screw 96 is loosened and arm 88 is raised so that the latter can be angularly displaced relative to shaft 50 and lower arm 52, as shown in Fig. 6, thereby swinging the plunger 78 and its head out of axial alignment with the spindle 58 to permit the marking wheel 48 to be lifted, as indicated by the arrow on Fig. 6, off its supporting structure. Thus, the marking wheel can be replaced, and the above procedure is reversed in order to again support the spindle at its upper end and prevent upward movement of the replaced marking wheel. Since the marking wheel 48 is made up only of the shell 74

and marking element 76, it is apparent that the replaceable marking wheels are simple and inexpensive to reduce the cost of maintaining a supply of such wheels for replacement purposes. If desired, a helical spring 79 may be provided on plunger 78 between arm 88 and head 80 to yieldably urge the plunger downwardly to a position in which the top end of spindle 58 is received in bore 82 with the pin 84 seating in the corresponding groove at the top of the spindle.

The marking apparatus 10 further includes a metering roll 98 mounted in the apparatus frame for rotation about a vertical axis in rolling and ink transferring contact with the marking wheel 48. The support for metering roll 98 includes a vertical, hollow shaft 100 which is supported at its upper and lower ends in ball bearings 102 mounted in the frame cross-members 38 and 40. A sleeve 104 is disposed on hollow shaft 100 and is rotatably displaceable relative to the latter, with the metering roll 98 being secured on the sleeve 104. A relatively wide or broad faced spur gear 106 is fixed on the lower end of sleeve 104 at a location below the level of table 14 (Fig. 4), and meshes with the narrow gear 68 to drive the latter, with the meshing engagement of the gears being maintained during the vertical adjustment of the marking wheel. Since the gears 68 and 106 are disposed below the level of conveyor table 14, such gears can have pitch diameters equal to the diameters of marking wheel 48 and metering roll 98, respectively, without interfering with marking of articles on the table. Thus, the usual compound gearing required in existing apparatus between gears on the metering roll and marking wheel above the level of the conveyor path to provide the same peripheral speeds at the marking wheel and metering roll can be eliminated to avoid the noisy operation resulting from such compound gearing.

At its lower end below the cross-member 40, hollow shaft 100 has a bevel gear 108 fixed thereto and meshing with a bevel gear 110 (Figs. 3 and 4) which is fixed to a horizontal shaft 112 journaled in the lower portions of vertical frame members 34 and 36. In order to synchronize the rotational movement of the metering roll and marking wheel with the movement of the articles on the conveyor 12, the shaft 112 is preferably driven from the conveyor. For example, as shown in Figs. 1, 2 and 4 of the drawings, a sprocket 114 may be fixed on shaft 112 and driven by an endless chain 116 which also passes over a sprocket 118 fixed on the driving shaft 26 of the conveyor. Thus, by selecting the proper ratios for the gears 108 and 110 and for the sprockets 114 and 118, the peripheral speeds of the metering roll and marking wheel can be the same as the linear speed of the articles advanced by the conveyor to avoid blurring of the inked impressions.

In accordance with the invention, marking apparatus 10 includes an arrangement for registering or shifting the location of the applied marking on the article in the direction of movement of the latter on the conveyor 12 during operation of the marking apparatus. Such registration is achieved by angularly shifting the hollow shaft 100, having the gear 108 thereon which is driven from the conveyor, relative to the sleeve 104 which has the gear 106 fixed thereon and meshing with the gear 68 on the driving sleeve 64 carrying the marking wheel. Referring to Figs. 3 and 5, it will be seen that a plunger 120 is disposed within hollow shaft 100 and carries a pin 122 which extends diametrically through helical slots 124 formed in the hollow shaft 100 with the opposite ends of pin 122 projecting slidably into axially extending grooves 126 formed in the internal surface of the sleeve 104. Thus, axial movement of plunger 120 within shaft 100 is converted into an angular displacement relative to the shaft by the cooperative action of pin 122 and helical slots 124, and this angular displacement is transmitted to sleeve 104 by the engagement of the ends of pin 122 in grooves 126.

In the embodiment of the invention illustrated in Figs. 1 to 6, inclusive, the axial movement of plunger 120 within hollow shaft 100 is effected by an adjustment screw 128 threadably extending through the upper cross-member 38 of the apparatus frame and projecting loosely into the upper end of hollow shaft 100, with an anti-friction ball 130 being interposed between the end of screw 128 and the upper end of plunger 120. A spring 132 is interposed between the lower end of plunger 120 and an adjustable plug 134 engaged threadably in the lower end portion of hollow shaft 100 for varying the compression of spring 132 which yieldably urges the plunger upwardly toward the screw 128. A lock-nut 136 is provided on screw 128 (Fig. 3) to engage against the top surface of cross-member 38 for holding the screw 128 in its adjusted position.

The helical slots 124 are arranged so that the ends of the pin 122 tend to move toward the upper ends of the slots during operation of the machine with such movement of the pin being resisted by the screw 128 acting through ball 130 against the upper end of plunger 120. Thus, in the illustrated marking apparatus, which is intended to mark the left-hand side surfaces of the successive articles on conveyor 12, the marking wheel 48 is rotated in the counter-clockwise direction, as viewed from above in Fig. 1, and the metering roll 98 rotates in the clockwise direction, with the helical slots 124 being inclined upwardly in the counter-clockwise direction, as shown on Fig. 5. However, in marking apparatus intended for marking the right-hand side surfaces of the successive articles on the conveyor, the marking wheel and metering roll would rotate in the direction opposite to those given above for the illustrated apparatus, and the helical slots 124 in the hollow shaft 100 will incline upwardly in the direction opposite to the rotation of the metering roll, that is, in the clockwise direction.

In a preferred embodiment of the invention illustrated in Fig. 7, wherein the parts corresponding to those included in the first described embodiment are identified by the same reference numerals, the axial movement of the plunger 120 within the hollow shaft 100 is effected by an adjustment device constructed and arranged for use, without change, in marking apparatus intended for marking the opposite sides of articles on the conveyor. This preferred adjustment device includes an internally threaded, open-ended cylindrical member 111 formed with an outwardly directed flange 113 which is secured, as by the machine screws 115, on the upper cross-member 38 of the apparatus frame with the axis of member 111 in alignment with the axis of plunger 120.

An externally threaded, hollow screw member 117 is engaged within cylindrical member 111 and, at its lower end, carries a combination radial-thrust bearing 119 with the inner race of that bearing being secured to the upper end of plunger 120. Thus, when the hollow screw member 117 is raised or lowered by rotation thereof relative to the fixed member 111, such vertical movement of member 117 positively raises and lowers the plunger 120 to vary the location of pin 122 in the helical slot (not shown on Fig. 7) of the hollow shaft 100. By reason of the positive actuation of the plunger 120 in both the upward and downward directions, the spring 132 and screw abutment 134 of Fig. 5 can be eliminated in the embodiment of Fig. 7, and the helical slots in the hollow shaft 100 can be inclined in the same direction in marking apparatus designed to mark either of the opposite sides of the articles.

In order to facilitate adjusting rotation of the hollow screw member 117, the latter is preferably provided with an outwardly directed rim or flange 121 at its upper end having a knurled peripheral surface, and a locking ring or nut 123 is screwed upon the outer surface of member 117 to bear upon the upper edge of member 111 for holding the hollow screw member in its adjusted position.

Preferably, the helical slots 124 have a sufficient extension in the circumferential direction to provide at least a thirty degree angular displacement of the marking wheel 48 during movement of pin 122 along the length of the helical slots, while the radial grooves 72a in the bottom end surface of the shell 74 of the marking wheel are angularly spaced apart by fifteen degrees. In preparing the apparatus for marking of articles on the conveyor, the marking wheel 48 is mounted on the driving shell 64 with pin 72 engaging in a selected one of the radial grooves 72a which locates the wheel for marking at approximately the desired location on the successive articles. Initially, the plunger 120 is vertically disposed for locating the pin 122 at approximately the centers of the helical slots 124 and, during the initial marking of the articles, the screw 128 or 117, as the case may be, is manually rotated in one direction or the other, to either raise or lower plunger 120 as required, and thereby to angularly displace driven sleeve 104 relative to hollow shaft 100 which is in turn driven from the conveyor. Such angular displacement of sleeve 104, independent of movement of the conveyor 12 is communicated to sleeve 64, carrying the marking wheel, by meshing gears 68 and 106 to adjust the location of the markings on the articles.

The above described structure for supporting and driving the marking wheel is adapted to conveniently accommodate marking wheels of different diameters so that a larger diameter wheel can be employed when a relatively long legend is to be applied to the sides of the articles or when relatively long articles are to be marked or the distance between successive pushers 20 on the conveyor chains is relatively great. In changing the marking wheel to one having a different diameter, it is only necessary, insofar as the drive for the marking wheel is concerned, to change the gear 68 to a gear having a pitch diameter which is the same as the diameter of the new marking wheel. Since shaft 50 carrying arms 52 and 38 (Figs. 4 and 6) is rotatable in the apparatus frame, the arms 52 and 38 can be angularly displaced to provide the desired rolling contact between the new marking wheel and the metering roll. In order to adjustably hold the marking wheel in rolling contact with the metering roll and in position to mark the successive articles, the shaft 50 has a lever or arm 138 fixed thereto, and two adjustment screws 140 and 142 (Fig. 1) extend threadably through frame member 36 to bear against arm 138 at opposite sides of the axis of shaft 50. Thus, by adjusting screws 140 and 142, the shaft 50, and with it the arms 52 and 58, can be angularly displaced to accommodate marking wheels of different diameters on the driving sleeve 64.

The marking apparatus 10 embodying the present invention also includes a removable component for supplying ink to the metering roll 98. This removable component is generally identified by the reference numeral 144 and includes a housing 146 having lugs 148 and 150 (Fig. 3) extending from the top and bottom, respectively, thereof for pivotal mounting upon the upper cross-member 38 and the lower cross-member 40 of the apparatus frame. An upstanding pin 152, shown in broken lines on Fig. 3, extends from cross-member 40 to pivotally support lug 150, while a bolt 154 extends downwardly through lug 148 and is threaded into cross-member 38 in axial alignment with the pin 152.

A vertical shaft 156 is journaled in suitable bearings 158 in the top and bottom of housing 146 with its axis spaced from the axes of pin 152 and bolt 154 and carries an ink supplying roll 160 preferably provided with a resilient, for example, rubber, outer layer, for rolling contact with the metering roll 98. At its upper end, shaft 156 has a gear 162 fixed thereto and meshing with a gear 164 fixed on the upper end portion of hollow shaft 100 carrying the metering roll so that the ink supplying roll is driven, from, and in synchronism with, the metering roll 98.

A lower portion of housing 146 defines an ink reservoir 166 and a gear pump housing 168 is secured to the bottom of housing 146 below the reservoir. The gear pump housing 168 accommodates two meshing pumping gears 170 and 172, and the bottom of housing 146 is provided with an inlet opening (not shown), through which ink enters the pump housing 168 from the reservoir 166, and an outlet opening 174 (Fig. 3), through which the ink is pumped by the action of meshing gears 170 and 172 when the latter are rotated. An ink supplying pipe 176 extends upwardly from the opening 174 and is bent laterally at its upper end, as at 178, to discharge the pumped ink in the form of a stream against the upper portion of the ink supplying roll 160. As seen in Fig. 3, the opening 174 and the interior of pipe 176 preferably form a smooth and continuous surface to avoid any internal roughness or projections which might catch the ink pigment and eventually cause clogging of the ink supplying line.

In order to provide a self-contained unit driven entirely from the associated conveyor 12, the pump gears 170 and 172 are preferably connected, by suitable gears, to the shaft 156 for rotation with the latter. For example, as shown in the drawings, shaft 180 carrying pump gear 172 extends out of the pump housing 168 through a suitable packing gland 182 and, at its lower end, has a gear 184 fixed thereto in meshing engagement with a gear 186 fixed to the lower end of shaft 156 projecting downwardly from housing 146. A shroud 188 extends around shaft 156 to a point above the level of the ink in reservoir 166 and into the hollowed-out lower portion of roll 160 to prevent the flow of splashed ink down into the lower of the bearings 158. The housing 146 is open at one side to permit rolling contact of roll 160 with metering roll 98, and the lower portion of housing 146, at the open side of the latter, is formed with a collecting sump 190 (Fig. 3) for receiving the excess ink pouring from the rolls 98 and 160 at their line of contact and for returning the excess ink to the reservoir 166.

The housing 146 is preferably spring urged about the swinging axis defined by pin 152 and bolt 154 to a position in which gear 162 meshes with gear 164 of the metering roll assembly and the ink supplying roll 160 is in rolling contact with the metering roll 98. For example, as shown in Fig. 1, a spring 192 can be removably connected at one end to a suitable anchor on the top of cross-member 38 and at its other end to an adjustable screw 194 extended threadably through a lug 196 (Fig. 2) on the top of housing 146 to yieldably urge the latter to swing in the direction approaching roll 160 toward roll 98. Further, an adjustable stop, which may be in the form of an adjustable screw 198 carried by housing 146 to engage against an abutment 200 on the apparatus frame, is preferably provided to limit the spring urged swinging of housing 146 and hence the contact of roll 160 with roll 98.

In operation, the pump gears 170 and 172 are driven at a speed sufficient to pump the ink through pipe 176 at a rate far in excess of the rate required for coating of the metering roll 98. The pumped ink is discharged against ink supplying roll 160 at a location spaced circumferentially from the line of contact of that roll with the metering roll 98 and is carried by the ink supplying roll to that line of contact while being gravitationally distributed in the axial direction. At the line of contact of roll 160 with roll 98, the ink is squeezed between the rubber surface of roll 160 and the surface of the metering roll with a film of ink being deposited on the latter. Preferably, the surface of the metering roll 98 is etched or otherwise roughened so that ink is collected in the depressions thereof. The thickness of the ink film deposited on the metering roll 98 is determined to some extent by the contact pressure between rolls 98 and 160, which is dependent upon the tension in spring 192 and the setting of stop screw 198, the hardness or softness of the rubber outer layer of the ink supplying roll 160, and

the depths of the depressions in the surface of roll 98. The excess ink, that is, the ink poured against roll 160 in excess of that required for the film deposited on roll 98, forms a heavy bead in back of the line of contact between the rolls 160 and 98, and this bead acts as a solvent to clean away dried ink on the surface of roll 98 when the apparatus is initially operated after a period of inactivity or after a change in the color of the ink. The excess ink of the bead drops into the collecting sump 190 and is returned by the latter to the reservoir 166, while ink film deposited on metering roll 98 is transferred to the marking element or elements on the periphery of marking wheel 48 which applies the desired markings to the side surfaces of the successive articles on conveyor 12.

Preferably, wipers are provided in contact with the upper ends of the ink supplying roll 160 and metering roll 98 to prevent the build-up of ink above the line of contact of such rolls, and with the lower end of the metering roll 98 to prevent the carrying of ink on the lower end surface of that roll beyond the range of the collecting sump 190. For example, as seen in Figs. 7 and 9, an upper wiper 202 includes a leather pad 204 carried by an arm 206 of resilient metal which is mounted, as at 208, upon one or the other of the flanks 210 of the pump housing 146 at the sides of the opening of the latter so that the pad 204 is resiliently urged into contact with the upper end surfaces of the rolls 98 and 160. Further, by way of example, a lower wiper 212 (Figs. 7 and 8) preferably formed of leather is mounted adjustably, as by the screws 214 engaging in elongated slots 216, upon the upstanding wall of sump 190 to engage the lower end surface of metering roll 98 at a raised upper edge portion 218 of the wiper. While the wipers 202 and 212 have been illustrated in connection with the embodiment of Fig. 7, it is to be understood that they may be similarly applied to the embodiment of Figs. 1 to 6. Further, the lower end of ink supplying roll 160 preferably extends below the lower end of roll 98 so that the excess ink primarily flows off the roll 160 which is shielded, at its lower end, by the upstanding wall of sump 190, and radial scattering of the excess ink is intercepted by the sump wall.

In order to save the time usually required for cleaning out the ink reservoir, pump, supply lines and the like when the color of the ink is to be changed, the ink supplying component 144 of the described apparatus can be removed as a unit from the remainder of the apparatus and replaced by a similar component having the desired ink therein. Such removal is conveniently accomplished by detaching spring 192 at one of its ends and removing bolt 154 to permit housing 146 to be swung on pivot pin 152 until sump 190 is clear of the metering roll 98, after which the component 144 is lifted to free lug 150 from its pivot pin 152. The reverse procedure can then be followed in installing the new ink supplying component in operative position on the apparatus frame.

When the apparatus is inactive for a substantial period, the stop screw 198 can be extended against abutment 200 a distance sufficient to space rubber covered roll 160 from metering roll 98 so that the rubber outer layer of roll 160 will be relieved of the normal contact pressure to avoid the forming of an indentation in the surface of roll 160 by reason of the continuous application of such pressure at the same location.

It is apparent that the ink supplying component 144 described above and embodying the present invention provides a compact assembly with the other elements of apparatus 10 and avoids the separate pump driving motor and extended ink supplying pipes which clutter the area around the marking station in the existing apparatus of the described character.

In Fig. 10, an alternative and preferred arrangement is illustrated for yieldably urging the housing 146 to swing about the axis defined by pin 152 and bolt 154 to a position in which gear 162 meshes with gear 164 and the ink supplying roll 160 is in rolling contact with the metering

roll 98. This preferred arrangement includes a plate 220 secured to housing 146 and extending beyond the latter. Adjacent its free end, plate 220 is formed with an opening into which a bolt 222 is adapted to extend. A helical compression spring 224 is provided on bolt 222 between an adjustment nut 226 which is threaded on the bolt and an abutment 228 which is slidable on the bolt and retained on the latter by a stop ring 230 at the end of bolt 222. The abutment 228 has a diameter larger than that of the opening in plate 220 to bear against the latter and thereby to transmit the resilient force of spring 224 to plate 220.

The bolt 222 is pivotally supported, as at 232, upon a rotatable setting member 234 which is carried by a fixed support 236. A handle 238 extends from setting member 234 to facilitate angular displacement of the latter, and a fixed stop 240 is disposed in the path of handle 238 to limit the angular displacement of the handle and of member 234 in one direction to a position in which the pivoting axis of the connection of bolt 222 to member 234 is slightly beyond a line drawn through the center of member 234 parallel to the axis of bolt 222.

It is apparent that rotation of member 234 in the counter-clockwise direction from the position shown in Fig. 10 through approximately 90°, will serve to withdraw bolt 222 from plate 220 so that the pressure of spring 224, is removed from the plate 220 to permit swinging of housing 146 until the sump 190 thereof is clear of the metering roll 98. However, during operation of the machine, the force of spring 224 adjusted by nut 226, acts through abutment 228 and plate 220 to bring about the desired contact between the ink supplying and metering rolls, and the reaction of the spring force, when the member 234 is operatively positioned, as in Fig. 10, urges the member 234 to rotate in the clockwise direction, thereby to hold handle 238 against stop 240.

Further, while the ink supplying pipe 176 of the embodiment of the invention shown in Fig. 3 is in one piece and contained wholly within housing 146, the ink supplying pipe is preferably formed of a rigid section 176a, which extends up from the opening 174, and a flexible section 176b which is connected to the upper end of the rigid section, as shown in Fig. 11. The flexible section 176b extends from the rigid section out of housing 146 through a first opening 146a and then back into the housing through a second opening 146b so that, during operation, a loop of the flexible section is disposed outside of the housing and can be manipulated to vary the distance between the discharge end of the flexible section and the surface of the ink supplying roll 160. It is also apparent that, with the preferred arrangement of Fig. 11, the upper end portion of flexible section 176b can be withdrawn from the housing 146 and directed downwardly, as shown in broken lines at 176b, to discharge the ink into a suitable receptacle (not shown) when it is necessary to empty the reservoir 166.

While a particular embodiment of the present invention has been described in detail herein and illustrated in the accompanying drawings, merely by way of example, it is to be understood that the invention is not limited to that precise embodiment, and that various changes and modifications can be effected therein without departing from the scope or spirit of the invention as defined in the appended claims.

What is claimed is:

1. In marking apparatus of the described character having a frame for mounting adjacent a side of an article conveyor, a marking wheel, a metering roll, means mounting said metering roll in said frame for rotation about a vertical axis and means for supplying ink to the metering roll; means mounting said marking wheel on the frame for rotation about a vertical axis in rolling contact with the metering roll and in marking contact with the adjacent side surface of successive articles on

the conveyor and including a vertical shaft mounted in said frame for rotation about an axis spaced from the axis of the metering roll, upper and lower support arms extending radially from said shaft, a support spindle extending upwardly from the free end of said lower arm, a rotatable sleeve on said spindle, said marking wheel being formed to telescope over said sleeve from above, a plunger extending down from said upper arm and movable vertically relative to the latter, said plunger having a head at the lower end thereof formed to extend over the upper end of said spindle to retain said marking wheel on said rotatable sleeve, means securing one of said upper and lower arms against swinging relative to said shaft, releasable means for securing the other of said arms relative to said shaft in a position aligning said plunger with said spindle so that, after said plunger has been raised to free said spindle from said head of the plunger and upon release of the last mentioned means, said upper and lower arms can be swung relative to each other to displace the axis of said plunger from said spindle and thereby to permit the upward removal of the marking wheel from said sleeve, and adjustable means for rotationally positioning said vertical shaft with respect to said frame so that said shaft and both of said support arms can be swung relative to said frame to accommodate marking wheels of different diameters in rolling contact with said metering roll.

2. In marking apparatus of the described character; mounting means for the marking wheel according to claim 1, wherein the lower end of said spindle is screwed into said lower arm to effect axial movement of said spindle, sleeve and marking wheel in response to rotation of said spindle and said plunger is rotatable in said upper arm, and including detachable coupling means in said head and at the upper end of said spindle to transmit manual rotation of said plunger to said spindle for effecting the vertically axial adjustment of said marking wheel.

3. In marking apparatus of the described character; mounting means for the marking wheel according to claim 2, further including releasable means for clamping said plunger in said upper arm to prevent axial movement and rotation of said plunger relative to said upper arm.

4. In marking apparatus of the described character having a frame for mounting adjacent a side of an article conveyor, a marking wheel mounted on the frame for rotation about a vertical axis in marking contact with the adjacent side surfaces of successive articles on the conveyor and a metering roll to which ink is supplied for transfer to the marking wheel; the combination of means mounting the metering roll in said frame for rotation about a vertical axis in rolling contact with the marking wheel and including a hollow vertical shaft journaled in said frame, means for rotating said vertical shaft in synchronism with the advancement of articles on the conveyor, a driving sleeve carrying said metering roll and fitting over said vertical shaft, said sleeve being rotatable relative to said shaft, means coupling said sleeve to said shaft including a plunger rotatable and axially movable in said hollow shaft, said hollow shaft having helical slots therein and said sleeve having axial grooves in the internal surface thereof, a pin extending diametrically through said plunger and said helical slots into said axial grooves so that vertical movement of said plunger within said hollow shaft produces angular displacement of said sleeve relative to said hollow shaft and means for effecting vertical movement of said plunger, a first gear fixed to said sleeve for rotation and angular displacement with the latter, and a second gear rotatable with said marking wheel and meshing with said first gear to effect rotation of said marking wheel in synchronism with advancement of articles on the conveyor and to transmit the angular displacement of said sleeve relative

to the driven shaft to said marking wheel for registering the latter with respect to the articles being marked.

5. In marking apparatus of the described character; the combination according to claim 4, wherein said means for effecting vertical movement of said plunger includes an actuating screw threaded through said frame and extending axially into the upper portion of said hollow shaft, anti-friction means interposed between the confronting ends of said actuating screw and plunger, a plug threaded into the lower end portion of said hollow shaft, and resilient means interposed between said plug and the lower end of said plunger to yieldably urge the latter upwardly; and wherein said helical slots in the hollow shaft are inclined upwardly in the direction counter to the rotation of said hollow shaft so that the rotation tends to urge said pin toward the upper ends of said slots.

6. In marking apparatus of the described character; the combination according to claim 4, wherein said means for effecting vertical movement of said plunger includes an internally threaded member fixed on said frame in axial alignment with said plunger, a screw member threadably engaging in said internally threaded member and carrying a combined radial-thrust bearing rotatably connected to said plunger so that rotation of said screw member raises and lowers said bearing and the plunger connected thereto.

7. In marking apparatus of the described character having a frame for mounting adjacent a side of an article conveyor, a marking wheel mounted on the frame for rotation about a vertical axis in marking contact with the adjacent side surfaces of successive articles on the conveyor and a metering roll mounted in said frame for rotation about a vertical axis in rolling contact with the marking wheel; an ink supplying component for feeding ink to the metering roll including a housing open at one side and having vertically aligned and spaced lugs extending from one side for engagement from above on related portions of said frame, axially aligned pivot means on said related portions of the frame for pivotally engaging said lugs, a vertical shaft rotatably journaled in said housing and carrying ink supplying roll, said vertical shaft being disposed at a location spaced laterally from the axes of said pivot means and projecting said ink supplying roll through said open side of the housing for rolling contact with said metering roll, said housing further having an ink collecting sump extending from said one side thereof for disposition under the line of contact of said ink supplying roll with said metering roll to catch ink dripping from said line of contact, means for discharging ink from said sump against said ink supplying roll, and releasable means for holding said housing against swinging about said axes of the pivot means in a position contacting said ink supplying roll with said metering roll, so that, after the last mentioned means has been released, said housing can be swung to clear said sump from under said metering roll and thereby to permit removal of said housing from said frame by disengagement of said pivot means from said lugs.

8. In marking apparatus of the described character; an ink supplying component according to claim 7, wherein said pivot means includes a pivot pin projecting upwardly from the lower one of said related portions of the frame and into the corresponding one of said lugs, and a securing bolt extending down through the upper one of said lugs and threaded into the upper one of said related portions of the frame so that, after said sump clears the metering roll, removal of said securing bolt permits disengagement of said lower lug from said pivot pin by lifting of said housing relative to said frame.

9. In marking apparatus of the described character; an ink supplying component according to claim 7, wherein said releasable means includes a tension spring connected between said frame and housing for yieldably urging the latter to swing in the direction contacting said

ink supplying roll with said metering roll, and further comprising adjustable stop means on said frame and housing to limit swinging of the latter in said direction and thereby to adjustably control the contact of said ink supplying roll with said metering roll.

10. In marking apparatus of the described character; an ink supplying component according to claim 7, wherein said sump is defined by the lower portion of said housing, and said means for discharging ink from said sump against said ink supplying roll includes ink pumping means mounted on the bottom of said housing and having an inlet for receiving ink directly from said sump and an outlet for discharging the pumped ink, and an ink conveying pipe in said housing extending from said outlet to a location adjacent the upper portion of said ink supplying roll for discharging the pumped ink against the latter, said pipe and outlet having a smooth internal bore to discourage the deposit of pigment particles therein and thereby to avoid clogging of the passage for ink from said pumping means to the ink supplying roll.

11. In marking apparatus of the described character; an ink supplying component according to claim 10 in combination with means for rotating said metering roll, meshing gears respectively rotatable with said metering and ink supplying rolls to transmit rotation of said metering roll to said ink supplying roll, and means driven by said shaft carrying the ink supplying roll for actuating said pumping means.

12. In marking apparatus of the described character; the combination according to claim 11, wherein said pumping means includes a pump housing at the bottom of the first mentioned housing and accommodating pumping gears in mesh with each other and rotatable about vertical axes and a drive shaft extending from one of said pumping gears out of said pump housing, and wherein said means for actuating the pumping means includes meshing gears on the bottom of said vertical shaft carrying the ink supplying roll and on said drive shaft extending from said one pumping gear to transmit the rotation of said ink supplying roll to said pumping gears.

13. In marking apparatus of the described character; an ink supplying component according to claim 10, wherein said ink conveying pipe includes a rigid lower section extending from said outlet and a flexible upper section extending from said rigid section, said housing having two vertically spaced apart openings in the wall thereof opposite said one side, said flexible section extending out of said housing through the lower of said openings and then back into the housing through the upper of said openings so that a loop of said flexible section is exposed outside of the housing to permit manipulation thereof for adjusting the distance between the discharge end of the ink conveying pipe and the surface of the ink supplying roll, and so that the flexible section can be withdrawn from said upper opening to discharge the pumped ink outside of the housing for emptying said sump.

14. In marking apparatus of the described character; an ink supplying component according to claim 7, wherein said releasable means includes a bolt having a helical compression spring thereon between a nut threaded on the bolt and an abutment slidable on the bolt to bear against the housing at a location remote from the swinging axis of the latter, and a setting member mounted for angular displacement about a fixed axis and pivotally connected to the other end of said bolt, said setting member being displaceable between an operative position in which said abutment contacts the housing and an inoperative position in which said bolt is withdrawn to remove said abutment from contact with the housing thereby to permit swinging of the latter to the extent necessary to clear said sump from under said metering roll.

15. In marking apparatus having a frame for mounting adjacent a side of an article conveyor, a marking wheel mounted on the frame for rotation about a vertical axis

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in marking contact with the adjacent side surfaces of successive articles on the conveyor and a metering roll mounted in said frame for rotation about a vertical axis in rolling contact with the marking wheel; an ink supplying component adapted for removable mounting, as a unit, on the frame and comprising an ink supplying roll for rolling contact with the metering roll, a reservoir for ink, means for discharging ink from said reservoir against said ink supplying roll, the lower end of said ink supplying roll extending below the lower end of said metering roll and said reservoir including an ink collecting sump having an upstanding wall extending around the portion of said ink supplying roll projecting below said metering roll, and wiping means engaging the upper end surfaces of said ink supplying and metering rolls to prevent the build-up of excess ink on said upper end surfaces and engaging the lower end surface of said metering roll to prevent the carrying of ink on said lower end surface beyond the range of said upstanding wall of the collecting sump so that radial scattering of excess ink flowing down-

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wardly off said ink supplying roll is intercepted by said upstanding wall of the sump.

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