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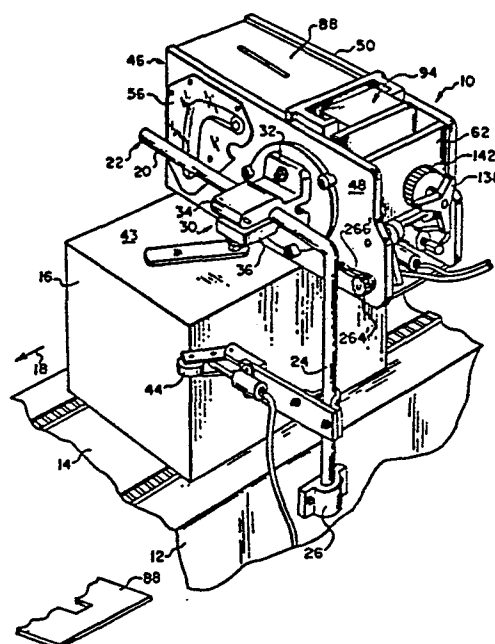
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64 **Reciprocable imprinting apparatus.**

67 An article marking apparatus (10) of the reciprocable impact type wherein an imprinting head (152) is driven from a rest condition is sealed engagement with an inking cartridge (106) through a ninety degree rotation to impact upon the surface of a passing article (43) whereby to imprint indicia information thereon by means of printing type (178) carried by said imprinting head (152). The imprinting head (152) is pivotally coupled to a pneumatic drive device (224) by a linkage (190, 192, 198). A guide in the form of a cam slot (212) and follower (206, 204) arranged is provided to define the path taken by the head (152). The cam and follower arrangement is arranged so that the velocity of rotation of the imprinting head means during an imprinting stroke is uniform at the locations proximate the ends of the strokes, with the velocity of rotation increasing in accordance with uniform rotational acceleration to the midpath of the strokes and decreasing under uniform deceleration to locations proximate the end of the strokes. This prevents shaking and/or misalignment of the imprinting head.



- 1 -

Reciprocable Imprinting Apparatus

This invention relates generally to article  
imprinting apparatus for imprinting information upon  
packages, cartons and the like as they travel successively  
spaced along the reach of a conveyor. More particularly,  
5 there is provided an improved impact type reciprocating  
imprinting apparatus which is more durable and versatile  
and less costly to fabricate, assemble and maintain than  
prior devices, which enables the employment of pre-inked  
ink cartridges and markedly increases the useful life  
10 thereof by having means for effecting sealing off of  
the cartridges during all but the actual imprinting stroke  
of the apparatus.

In particular, the apparatus provided by the  
invention includes an imprinting head carrying a biased  
15 releasably mounted type holder on which type font can be  
secured. An effective seal is established between the  
imprinting head and a disposable inking cartridge to  
prevent evaporative loss from the cartridge, except  
during the momentary translation of the head along a  
20 path leading to an angularly displaced imprinting location  
whereat the imprinting is performed. Drive and guide  
(idler) linkage means are provided to direct the imprinting  
head along said path in an imprinting stroke and a return  
stroke to resume the sealed engagement.

25 Known devices capable of imprinting information

upon surfaces of packages, cartons and the like conveyed spaced along a given path along the reach of the conveyor generally are of complex construction with accompanying expense of manufacture, fabrication, assembly and

5 maintenance. Two major types of devices are employed in imprinting indicia on packages and the like. One type of device includes a rotary imprinting wheel on which the type font can be mounted for repeated inking by rotary ink transfer means to which ink is supplied from a source

10 thereof, the imprinting wheel intercepting the article to be imprinted. The second major type of imprinting apparatus involves stamping or impacting inked type face means repeatedly upon successively arriving articles. The type face means is supplied with ink by impacting

15 the type face means upon an ink saturated pad or the like, usually supplied by some storage means such as cartridge or the like, which include an ink impervious body having a window through which access to the ink impregnated pad is enabled.

20 The invention herein is concerned with the substantial frequency of required maintenance involved with the repeatable impact type imprinting apparatus, and particularly the short life of the inking means employed. Frequent and time-consuming ink cartridge replacement

25 is the rule. One reason for such short cartridge useful life may be attributed to the unusually fast drying character of the ink employed. These highly volatile inks evaporate rapidly, usually depleting the ink pad after only a short time or leaving an inking surface which

30 quickly becomes hard and dry, preventing the normal capillarity effect to resupply the surface of the pad. This phenomenon is encountered where the ink supply takes the form of an ink-saturated absorbent pad disposed within a disposable cartridge having access window means to

35 accommodate the printing head. Often, the skin formed by

solvent evaporation is hard whereby ink is unevenly applied to the type font, or at least, is insufficient to effect uniform marking of the package, etc.

During the course of the operation of the  
5 imprinting apparatus, the imprinting head is disposed substantially longer at the rest condition, engaged against the inking pad surface. The translation of the imprinting head to the imprinting location and application of the imprint occupies minimal time and requires little exposure  
10 of the inking pad. Nevertheless, substantial reduction of the effectiveness of the inking means results since evaporation, etc. occurs while the type holder (carried by the imprinting head) is engaged with the inking pad of the ink storing cartridge.

15           Seals have been attempted with mixed results. Some attempts have interfered with the inking of the type font while others have been ineffective, failing to establish an effective seal.

It should be noted that the ink-saturated pad is  
20 generally resilient because of its saturated condition and the character of the ink absorbent material used to form the pad. The area of engagement of the imprinting head as well as the surface of the head engaging the pad is sometimes so resilient as to fail to establish an effective  
25 seal. The type holder seated on the imprinting head and effectively constituting same also is not well suited to make a proper seal with the ink-saturated pad or its surrounding border defining lining member, where provided. Accordingly, rapid evaporation of the fast drying ink  
30 still materially reduces the useful life of available cartridges requiring removal of the exhausted cartridge and replacement with a fresh cartridge. Often such premature disabling of the ink supply cartridges occurs many times during a normal (average) imprinting run regardless  
35 of the number of articles imprinted.

Another problem encountered with the employment of imprinting apparatus of the type described herein-above involves the formation of a hard skin formed on the pad as a result of evaporation. The skin prevents  
5 transfer of ink from the pad, even though there is substantial ink remanent within the impregnated storing pad. This results in premature removal and replacement of the cartridge long prior to depletion of the ink stored therein.

Still another difficulty encountered with a  
10 marking device such as described above involves the means employed to effect the translation of the imprinting head to the imprinting position and return. It is known to employ pivotable arms and the like to mount an imprinting head for repeated movement. Ordinarily, these arms are  
15 coupled to a source of dynamic power, such as a fluid operated hydraulic or pneumatic system coupled through a signalling device to a drive arm, in turn secured to an imprinting head and/or to the mounting therefor. Known drives cause the imprinting head to be translated from its  
20 rest condition to its angularly displaced position at the imprinting location, so that the imprinting head assumes an orientation with its centre line perpendicular to the surface upon which imprinting is to be effected.

It is difficult to maintain the head in the  
25 proper path to prevent deviation therefrom during translation to and return from the imprinting location. There has been considerable difficulty in achieving the proper orientation of said imprinting head as well as in controlling the contact pressure exerted by the imprinting  
30 head both upon the package surface and upon the ink-saturated pad. Where the contact pressure at impact is too great, smearing and/or other blurring of the imprint would be encountered. Often the imprinting head would be misoriented during its imprinting contact with the  
35 package surface, resulting in partial imprints, or

imprints carrying too much ink, notwithstanding the fast drying nature of the inks employed. The return stroke often strongly impacts in the relatively soft, yieldable surface of the ink-saturated pad whereby to cause splashing  
5 of ink fouling the apparatus, the imprinting head and carrier therefor, and often causing ink to be thrown outward, fouling the ambient surroundings.

Accordingly, it would be highly desirable to prevent the above adverse occurrences in a relatively simply  
10 constructed marking apparatus, and to include therein, means to prevent evaporative loss by establishing an effective sealed engagement between the ink cartridge and the printing head during all but the actual imprinting.

Another way of reducing ink loss is to control the  
15 impact or contact pressure exercised by the imprinting head (the type face carried thereby) upon the saturated inking pad. Often one had to elect between a contact pressure at impact sufficient to assure proper inking and reduction of contact pressure to prevent splashing of ink.

20 Control of the quantity of ink applied to the type font during each inking step has been found to be difficult. Too much ink applied to the type will result in smearing of the imprint. Applying too little ink will result in unsatisfactory faint imprints. Additionally, the force of impact  
25 upon the surface to be imprinted should be carefully controlled to assure proper clear and sharply defined imprints. Effecting of such controls as applied to the mechanical drive means is expensive and less than satisfactory.

The translation of the imprinting head between  
30 the pair of angularly displaced operating positions should be effected by mechanisms which are relatively simple in construction and are effective to assure proper orientation of the type carried by the imprinting head both on the ink saturated pad during the rest condition,  
35 and during the time period when momentarily displaced

therefrom to effect application of the imprint. Facility in servicing the imprinting apparatus also is a desirable feature not readily available with known imprinting devices of this type. Particularly, removability of  
5 both the inking cartridge and the type holder for replacement, change or reorientation would be highly desirable.

In view of the relative complexity of available imprinting apparatus of the type described, there has been a considerable and long felt need to effect reductions  
10 in the costs of fabricating, assembly and maintenance without reduction in efficiency and with achieving increased versatility of the apparatus. It also would be highly desirable to provide a marking apparatus which is versatile and capable of being mounted for operation universally  
15 in a plurality of orientations with facility and with efficiency and a minimum of maintenance downtime.

In addition, it would be highly advantageous to provide an intermittent impact reciprocable type imprinting apparatus which is capable of operation at relatively  
20 high speed without loss in effectiveness.

Another improvement desired over the known apparatus is to provide for adjustment of the imprint distance relative to the article being imprinted so that the installation (mounting) of the imprinting apparatus  
25 need not be changed (raised or lowered) to compensate for small changes in height of the articles.

The present application is divided from European Patent Application 81305034.1 (Publication No. 0050980).

The present invention provides an article  
30 imprinting apparatus comprising imprinting head means carrying type face means for applying an imprint to the surface of an object, inking cartridge means having an exposed inking surface adapted to be engaged by said type face means during a rest condition, drive means for  
35 translating said imprinting head means between the rest

condition and an imprinting position angularly displaced approximately ninety degrees of arc from the inking cartridge means and return, and linkage means including a drive link pivotally mounted at one end to a stationary  
5 pivot point and at the opposite end to a movable pivot point and a drive plunger for actuating said drive link, said imprinting head means being coupled to the movable pivot point whereby to effect the translation, and guide means for controlling the rotation of said imprinting  
10 head means about the movable pivot point, said imprinting head means being rotated simultaneously with the translation thereof along said path, characterised in that said guide means comprises cam and follower means, said follower means being pivotally mounted to said imprinting  
15 head means at a location offset from the movable pivot point and movable therewith during translation of the imprinting head means, said imprinting head means being rotatable about the movable pivot point at a constant rotational acceleration relative to the drive link, the  
20 velocity of rotation of the imprinting head means being uniform at the locations proximate the ends of the translation strokes, with the velocity of rotation increasing in accordance with the uniform rotational acceleration to the midpath of the strokes, and decreasing under uniform  
25 deceleration to locations proximate the end of the strokes.

Features and advantages of the present invention will become apparent from the following description of an embodiment thereof given by way of example with reference to the accompanying drawings, in which:-

30       Figure 1 is a top perspective view of the article imprinting apparatus constructed in accordance with the invention and viewed installed on a conveyor frame in proximity to articles to be imprinted;

      Figure 2 is an exploded top perspective view  
35 of the article imprinting apparatus illustrated in Figure



1 shown disassembled from the conveyor and in the process of being loaded with an inking cartridge, portions of the apparatus being broken away to show interior detail;

5           Figure 3 is a bottom perspective view of the imprinting apparatus illustrated in Figure 2, portions of same being deleted to show interior detail; and

          Figure 4 is an enlarged elevational view of the imprinting apparatus of Figure 1 with portions  
10 deleted and shown partially in section, to show interior details.

          The invention herein provides an intermittent impact type imprinting apparatus for applying imprint information upon a facing surface of packages, cartons,  
15 and the like conveyed spaced along a given path along the reach of a conveyor.

          An imprinting head is positioned adjustably for intermittent translation between a rest condition seal-  
ingly engaged with the surface of an ink saturated medium  
20 in the form of a removable pre-inked ink storing cartridge and an angularly spaced imprinting position effected by a signal-controlled pressurized fluid operated drive system so that the imprinting head contacts the surface of the article to be imprinted.

25           The imprinting head is translated between these two positions by a drive linkage coupled to said fluid operated system and is guided by cam and follower means coupled to said imprinting head. The path of the cam slot of the cam and follower means is developed so as to effect  
30 a constant angular acceleration of the imprinting head during the imprinting stroke from the load condition engaged with the cartridge to the midpath, and a constant deceleration from the midpath to the terminus of the imprinting stroke. The minimization of the rate of  
35 rotation of the imprinting head near the ends of the stroke

effectively prevents shaking and/or misalignment at the ends of the stroke.

The enlarged head includes an outwardly opening socket which includes the cavity for receiving the type holder to enable limited biased movement thereof therein. The type holder includes a base lock arrangement for securely holding type elements therein. A resilient gasket may be secured, preferably by adhesive material, to the outer rim of the type holder for co-operating with sealing means surrounding the ink-saturated surface of the inking cartridge whereby to establish a sealing engagement therewith during the period while the imprinting head is at rest position. Means are provided to seat the ink cartridge within the apparatus and adjustably to lock the same there-  
15 within and to exert a controlled adjustable force there-upon.

The seal between the imprinting head and the ink cartridge also can be effected by providing a dished sealing plate or mask assembled with the ink cartridge in the imprinting apparatus. The sealing mask has a window formed therein which is surrounded by an inner rim. The mask is positioned with the inner rim seated closely proximate the exterior facing inking surface of the ink-saturated pad of the cartridge. The type holder that is  
25 preferably, the gasket secured to the end of the type holder, engages the inner rim to establish the sealed engagement for the duration the imprinting head is at the rest position (condition) so that no evaporative loss of ink occurs. Effectively, a sealed chamber is formed  
30 wherein there is a solvent rich atmosphere about the type enabling the type to remain thereat for a considerable duration without loss due to evaporation. The inking of the type is improved considerably as a result.

The type holder is biased to enable the type  
35 holder to fly out inertially from the imprinting head

when the latter is stopped in its translation to the rest condition by impacting upon the frame of the ink cartridge assembly, whereby to impact upon the ink saturated surface of the cartridge. Where the sealing mask is employed, the sealing gasket impacts against the inner rim of the mask. The type font elements carried by the base lock means provided on the type holder extend a fraction outward of the sealing surface so that the end surfaces of the type font are coated with sufficient ink yet overloading of the type font with ink is prevented. In addition, splashing of ink upon impact is materially reduced, if not prevented altogether.

Referring now to the drawings for details, the article imprinting apparatus constructed in accordance with the invention herein is designated generally by reference character 10 and is illustrated in Figure 1, mounted on the frame 12 of a conveyor 14 along which articles 16 travel in a direction indicated by the arrow 18 past said apparatus 10 to enable single imprinting of each with informational indicia.

The apparatus 10 is illustrated mounted on the horizontally oriented arm 20 of bent rod 22, with the vertically oriented arm 24 secured to the frame 12 by clamp 26. Releasable clamp 30 effects the securement of the apparatus 10 to the arm 20 in operating condition and includes a clamping bracket 32 having a pair of generally parallel spaced arms 34 and 36, each including arcuate facing portions 38 to receive the rod arm 20 therebetween. The arms 34 and 36 are capable of being urged together by a capped bolt 40. A captive flat wrench 42 is retained on the capped bolt 40 by a washer 40' and snap ring 40" secured inward of the capped bolt 40. The wrench 42 functions as a lever which can be utilized to release the rod arm 20 or to clamp same at a location assuring proper location of apparatus 10 for application of an

imprint upon the surface 43 of the article 16.

The desired height at which the apparatus 10 is disposed can be fixed by manipulation of the relationship of the rod arm 22 and clamp 26. Rod arm 22  
5 also can carry an actuating lever 44 extending into the path of the article 16 in position to be tripped by the passage of the leading end of the article therepast. The lever 44 is a one-shot actuator and only initiates the imprinting operation, a return switch being incorporated  
10 within the apparatus.

The apparatus 10 comprises a housing 46 formed of a pair of mounting plates 48 and 50 which are arranged side by side, spaced apart and connected by transverse corner braces 52 and 54 seated in aligned apertures  
15 (not shown) formed in said plates 48 and 50 and secured thereto by screws 60. End wall 62 is secured in position between plates 48 and 50 by screws 64. Transverse brace 66 is secured between said plates 48 and 50 by screws 68 and bottom plate 70 is secured to the brace 66 by screw  
20 72 whereby to define the housing 46.

The inner surfaces 74 and 76 of plates 48 and 50 carry coextensive, aligned, matching, horizontally oriented, facing grooves 78 and 80 parallel and adjacent the upper edges 82 and 84 of said plates 48, 50 and  
25 extending about two thirds of the total length of said edges. Grooves 74 and 76 open to end 86 of the respective plates 48 and 50 slidably to receive the edges of cover plate 88.

A pair of matching, facing, vertically oriented  
30 grooves 90 and 92 are formed in plate surfaces 74 and 76 opening to the upper edges 82 and 84 of said plates 48 and 50. The inking cartridge assembly 94 is received within the housing 46 in chamber 96 defined between the grooves 90 and 92 and the end wall 62 by sliding the  
35 assembly 94 in grooves 90 and 92 until the inking cartridge

assembly 94 seats on facing stop pins 98 set into said plate surfaces 74 and 76.

The inking cartridge assembly 94 comprises a holding frame 100, a sponge-like rectangular gasket 102  
5 and an ink storing container 104, which is pre-inked and is commercially available. Gasket 102 is preferably formed of spongy material such as closed-cell foam rubber or the like. A thin layer formed of ink impervious rubber-like sheet material can be adhered to gasket 102, if  
10 desired. The container 104 comprises a plastic moulded, thin-walled, somewhat resilient, box 106 having an entrance 110 and an outer rim 112 coextensive with said entrance 110 and surrounding same, and an inner rim (not shown).

15 An ink-saturated pad 114 is disposed within the interior of the box 106, preferably fully occupying the interior thereof. A sheet liner 108 generally is included across the top of the box to shield and seal off the entrance 110 preventing access to the interior pad 114  
20 until assembly thereof into the cartridge unit 94 is desired. The liner 108 usually is provided with a scored area, removal of which defines a window to enable access to be gained to said ink-saturated pad surface but leaving a bordering portion between the inner rim and the  
25 ink-saturated pad 114. The window may be of rectangular, circular or even ovalular configuration, depending upon the perimetric configuration of the imprint to be applied to the surface 43 of article 16 or the overall size and/or configuration of the particular surface 43 say, if the  
30 surface comprises a bottle cap or the like (not shown).

The gasket 102 is engaged upon the outer rim 112 of the container 104 and together, slidably are engaged within the frame 100 in the channel 122 defined by inner rim 124 and flanges 126 of said frame, as indicated by the  
35 broken line 128. The cartridge assembly 94 now is complete

and ready for installation into chamber 96.

Preferably, referring to Figure 4, a thin plate or mask 270 of generally rectangular dish-shaped configuration is installed along with the cartridge assembly 94 functioning as supplementary sealing means for establishing a sealed engagement between the imprinting head of the apparatus 10 and the ink saturated pad 114 of the cartridge 94.

Mask 270 carries a central recessed floor and a window 274 is formed in the recessed floor, leaving inwardly directed rim portion 272. The mask 270 is seated on the frame holder 100 with the rim portion 272 engaged on the liner portion 108 closely adjacent the ink-saturated pad 114 and coextensively aligned with the window of the liner 108. Where the mask 270 is used, it is fitted on the cartridge assembly 94 and both are introduced simultaneously into the chamber 96 by sliding the rim portion and frame 100 into the grooves 90 and 92.

A holding structure 130 for retaining the cartridge assembly 94 in place within the chamber 96 is provided. The holding structure 130 comprises a plate member 132 of generally rectangular configuration carrying a central recess in which an aperture is formed. The plate 132 is smaller in area than the end wall 62 and is arranged parallel thereto. An elongate threaded bolt 134 is received through the aperture in the plate 132. A washer (not shown) is placed at the free end (not shown) of bolt 134 and locked in place by a lockwasher (not shown). A retaining nut 136 is seated on the bolt 134 at the opposite side of plate member 132.

The bolt 134 is threadably engaged through a passageway (not shown) and a retaining washer (not shown), including a small diameter spacer ring (not shown), are engaged on said bolt 134. The head of the bolt 134 mounts a knob 138 including collar 140. Rotation of the knob 138

will cause the plate to be moved away from the grooves 90 and 92, widening the space between the imprinting head and the plate 132 whereby the inking cartridge assembly 94 can be installed. Once the said inking cartridge  
5 assembly 94 has been installed, the plate member 132 can be brought to bear against the container 104. The rotatable wheel 142 seated on threaded bolt 134 between the collar 140 and the wall 62 functions to limit the extent of movement of the said plate member 132. Plate  
10 member 132 can be moved translated by the manipulation of the knob 138 to facilitate the removal of a spent or exhausted cartridge assembly 94 and in particular, the replacement of an exhausted container 104 with a fresh replacement container.

15           Attention now will be directed to the imprinting device, designated generally by reference character 150 which is disposed within the housing 46 for movement between a pair of angularly displaced positions, namely, a rest position, whereat a sealed engagement with the ink  
20 saturated pad of the inking cartridge assembly 94 is established and an imprinting position along an arcuate path 90° offset from the rest position.

          The imprinting device 150 as a unit comprises an elongate body 152 of generally rectangular configuration  
25 having an enlarged head 154 with an outwardly opening cavity 156 formed therein. The body 152 is provided with a through passage 158 for receiving a shaft therein to journal said body. A pair of parallel passageways 162 are formed through the enlarged head 154 opening to the  
30 cavity 156.

          Cap bolts 164 carry compression coil springs 166 and are seated in said passageways 162 and terminate secured in a T-bar (not shown). The dimensions of the passageways 162 and the bolts 164 are selected to permit  
35 free movement of the bolts 164 in said passageways while

limiting the coil springs 166 disposition between the caps 164 and the enlarged head 154. The T-bar normally is seated within the cavity 156 next adjacent the opening thereof.

5           A base-lock type support member 176 is seated securely within the cavity 174 of the type holder 170 and carries mounted therein, type font elements 178, there being rows of suitable slots for receiving the base of the type elements. A resilient sealing gasket 180 is  
10 adhesively or otherwise secured tightly on the rim 182 of the type holder 170 coextensive with the cavity 174 thereof. The thickness of said gasket 180 is selected to be only slightly less than the outermost extent of the type font elements 178 when they are seated in the base  
15 lock element 176. The gasket 180 serves multiple functions, namely, to cushion the shock of impact between the imprinting head 154 and the ink-saturated pad 114 or when provided, the inner rim portion 272 of mask 270. Gasket 180 also functions to cushion the shock of impact between the  
20 imprinting head 154 and the surface 43 of the article 16 when imprinting is performed at the end of the imprinting stroke.

When the type font is to be changed or when the orientation of the message also is desired to be changed  
25 for different packaging applications, provision is made according to the invention, for facilitating establishment of access to the type holder 170 and is particular for removing the type holder 170 or changing its orientation, reassembling the type holder 170 to the imprinting head  
30 154. The springs 166 are compressed by manipulation of the caps of bolts 164 toward the enlarged head 154. The caps 164 are urged against the bias of said springs 166 until the holder 170 is forced outward of the cavity 174 sufficiently to be disengaged from the imprinting head.

35           Attention now is directed to the drive linkage



and the cam and follower means of apparatus 10 co-operating effectively to translate the imprinting head 150 between the angularly spaced positions with constant angular acceleration to a maximum at midpath and deceleration, also constant to a terminal condition at the end of the imprinting stroke, the inertial extension thereafter effecting the printing impression. The drive linkage comprises a pair of link members 190 and 192, each having shallow arms 194. Arms 194 carry through passageways 196. Links 190, 192 are journaled on shaft 198 mounted in passageway 196 and through a bore taken through imprinting head 150.

The head 154 has a pair of extensions 200 and passageways 202 are formed therein. Shaft 204 is journaled in said passageway 202 and roller bearings (bushings) 206 are seated securely at the opposite ends of the shaft 204. A cam slot 210 is formed in each plate 48 and 50.

The cam slots 210 are identical, coextensive and aligned along their length when the plates 48, 50 are assembled to form the side parts of the housing 46. The cam roller bushings 206 are seated within the cam slots 210. The cam slots 210 are formed so that they guide the bushings 206 during the imprinting and return strokes, and hence the imprinting head 150 through a rotation of  $90^{\circ}$  with minimum possible contact on the cam face and with the load divided equally across its entire face.

The width of the slots 210 increases slightly at the corners 212, that is approximate the midpath of travel, over a generally constant width over the remaining portions to avoid possible binding due to manufacturing variations in the dimensions of the pertinent elements.

The path of the cam slot is developed so as to effect a constant angular acceleration of the imprinting

head during the imprinting stroke from the load condition to the midpath, engaged with the cartridge and a constant deceleration from the midpath to the terminus of the imprinting stroke. At the load condition, the imprinting head is arranged with the face of the type holder in a vertically oriented plane. At the terminus of the imprinting stroke, the type face is in a horizontally oriented condition.

The minimization of the rate of rotation of the imprinting head near the ends of the stroke effectively prevents shaking and/or misalignment at the ends of the stroke.

In the course of its travel, the imprinting head is rotated  $90^{\circ}$ , the angle defined between the centre line of link 190 and the centre line of the imprinting head, that is the pivot axis of said head, is between  $90^{\circ}$  and  $180^{\circ}$ . From  $0$  to  $9^{\circ}$ , the change of the latter angle is  $1^{\circ}$  for each degree of rotation of the link, the angular rotation is constant and the initial acceleration, zero.

From  $9^{\circ}$  to and through  $45^{\circ}$ , motion of the imprinting head is such as to obtain a gentle constant angular acceleration of the head with least (minimization of) thrust on the cam surface. The link moves through  $45^{\circ}$  rotation to the midpath (midpoint of the cam slot) while the angular rotation of the head is directed through  $90^{\circ}$  relative to the link.

The same path for deceleration is followed through the remaining  $36^{\circ}$  of movement of the link to the final  $9^{\circ}$  of the travel during which the imprinting head again assumes a parallelogrammic motion. The parallelogrammic motion ensures that the plane of the type face will be parallel to the impact surfaces during its final approach thereto.

With apparatus 10, the possibility of undesired foldover of the imprinting head is eliminated, the least

rate of rotation occurring at the end of the strokes (imprinting and return).

The path defined by the cam slot 210 is extended at its theoretical ends to provide for an additional angular movement of the link  $5^{\circ}$  at the opposite ends of the imprinting stroke and return stroke to ensure that the cam roller will not strike the ends of the path.

This also enables adjustment of the length of the stroke  $\pm 3/32$ nds as will be explained hereinafter.

10 The angular rotational acceleration of the imprinting head increases to a peak at the midpoint and then deceleration occurs through the remaining  $36^{\circ}$  until the  $81^{\circ}$  to  $90^{\circ}$  generally straight section is reached.

Links 190, 192 have enlarged end portions 214 through which there are pivot assemblies 216 and 218 with the axes of assembly 216 being generally parallel to passageways 196. Shaft 220 is mounted in pivot assembly 216.

The second pivot assembly 218 is positioned parallel to first pivot assembly 216. Pivot assemblies 216, 218 include bearings carried by the housing plates 48, 50. The shaft 220 is maintained in fixed relationship relative the pivot assemblies. Means are provided to fix the spacing between enlarged end portions 214 and to

25 centre the linkage assembly and imprinting head 150 between said plates 48, 50.

Shaft 220 is coupled pivotally to plunger 222 of cylinder 224 and is secured by nut 226.

There is a little "play" or looseness provided in the accommodation of said shafts through the respective bushings seated in the respective passageways as related so as to reduce the likelihood of binding during operation.

The drive mechanism for the apparatus 10 is designated generally by reference character 230 and

35 includes a fluid pressure operated cylinder 224 and the

plunger 222 movable between fully withdrawn and fully extended conditions within said cylinder 224, a four-way valve 234 coupled between the cylinder 224 and the source of pressurized fluid (not shown). The cylinder 5 224 is mounted fixedly to a rockable plate 236 provided with ears 238 and a depending flange 240. The threaded end 242 of the cylinder 224 is secured to the depending flange 240 of said plate 236.

The four-way valve 234 is seated interior 10 of the housing 46 adjacent the bottom plate 70 and is secured to the transverse bottom brace 66. The valve body 244 of valve 234 is arranged generally parallel and below the cylinder 224. Valve 234 is coupled to a source of fluid pressure (not shown) by tubing 246 15 secured to fitting 248. The tubing 250 couples the cylinder 224 to one port 252 of the valve 234 by securement to the fitting 254 of said cylinder 224. The fitting 254 is coupled to another portion of valve 234. Ball switch 256 is disposed at an end of the valve 234 opposite 20 the fitting 248.

In Figure 4 the ball switch 256 is illustrated in the condition assumed when the imprinting head 150 is at the terminus of its imprinting stroke. As the plunger 222 is driven out of the cylinder 224, the drive links 25 190, 192 (in broken line) is caused to pivot about the axis of shaft 198 through a part of the imprinting stroke until the imprinting head 150 is in the condition represented by the full representation.

Referring to Figures 1 and 3, the actuating 30 lever 44 disposed in the path of the article 16 is tripped by the leading end of said article 16. The interception of the article 16 by the actuating lever 44 operates the valve 224 to cause fluid pressure to be introduced into the cylinder 224 driving the plunger 222 outward of the 35 cylinder 224. As the plunger 222 is forced outward of

the cylinder 224, the imprinting head 150 is pivoted about shaft 198 directing the head 150 along a path represented by an arc. As the bearings 206 carried by the shaft 204 are driven further along the cam slot 210 toward the midpath point of the imprinting stroke, the imprinting head reaches its maximum angular speed of rotation and whips around the corner 212 directing the orientation of type holder 170 to approach a horizontal plane parallel to the surface of the package to be imprinted. After passing the midpath of the imprinting stroke guided by the cam slot 210, the head 150 decelerates angularly until stopped at the end of the said stroke. The type holder 170 is extended inertially to imprint the package surface.

15           The window 255 in bottom plate 70 has dimensions slightly larger than that of the type holder 170 so that the imprinting head will be directed, during imprinting, through the window 255 and will impact upon said surface 43. The parallelogrammic motion of the type holder 170 in the last portion of the imprinting stroke enables the inked type 178 carried by the type holder 170 effectively to kiss the surface 43 of the article 16 whereby not to damage same or to mishit same orientationally. The resilient gasket 180 on the type holder 170 absorbs the shock of engagement with the surface 43 and also functions to further enable the orientation of the type holder 170 to be self-adjusted so as to compensate for minor surface irregularities as well as to compensate for very minor height differences so long as the surface to be imprinted is disposed spaced from the imprinting head within the range of extension of said type font 178 carried by the type holder 170, inertially or when extended adjustably as will be explained later.

As the shaft 198 rotates, the bolt 257 carried thereby rotates sufficiently to signal the end of the

one-shot imprinting cycle by impinging upon the ball switch 256 when the imprinting head 150 has delivered the imprinting via type holder 170 and type font 178. Striking of the ball switch 259 initiates a return  
5 movement of the plunger 222 and hence initiates the return stroke to bring the imprinting head 150, and particularly, the type holder 170, back to its sealed relationship with the cartridge assembly 94. The exposure of the pad 114 is minimal.

10 As viewed in Figure 1 it is evident that the imprinting apparatus 10 also can be installed at a predetermined location relative to the conveyor and is adjustable for height and overhang, can be installed on either side of the conveyor within appreciable downtime,  
15 and can be rotated through any angular disposition relative to the conveyor.

The invention herein provides for a vernier type adjustment of the imprinting location by varying the terminal location of the imprinting stroke. This  
20 is accomplished pivotally by mounting the rocker plate 236 on an eccentric axis 258. The vertically offset point of the said eccentric mounting axis is variable to vary the terminus location a predetermined linear distance, here  $\pm 3/32$ nds of an inch. The adjustability  
25 compensates for variance in the normally encountered height once the imprinting apparatus has been mounted set up without disassembly. The variance of height of a series of packages being processed require compensation which can be adjusted manually by the operator without  
30 requiring such adjustment to be made in the mounting per se.

A plate 260 carries the eccentrically centered shaft which constitutes said axis 258. Plate 260 carries pin 262 which is secured to adjustment knob 264. Through  
35 arcuate slot 268 the pin 262 is guided for movement in

arcuate slot 266 formed in plate 48 along an angular path.  
(See arrow Figure 3). Movement of the pin 262 in slot  
266 causes the plate 236 to be shifted horizontally thus  
the extent of the imprinting and return stroke terminal  
5 with the said linear horizontal movement of said plate  
236. The apparatus is versatile, more durable than prior  
imprinting devices of the intermittent impact type,  
enables longer useful life for the inking cartridges in  
view of the improved sealing effect obtained. Selective  
10 hyper-extension of the type-holder can be provided for  
gaining access to the type holder 170 for removal and/or  
replacement thereof, as well as to change its orientation  
without the use of tools.

The invention is not limited to the use only of  
15 fluid operated systems such as described above. Electric-  
ally operated devices such as solenoids can be employed to  
drive the plunger or the linkages to move the imprinting  
head between its rest and imprinting positions. No means  
to intercept the imprinting head during either imprinting  
20 or return stroke need be provided. The desired path  
defined by the cam slot is sufficient to enable the desired  
orientation of the type holder to be reached at the imprint-  
ing location and at the terminus of the return stroke.

No precautions need be taken to prevent mis-  
25 folding of any linkages causing misalignment of the  
imprinting head or other interference with the desired path  
of said head during the imprinting and/or return strokes.  
The actuating lever 44 may be replaced by electronically  
operated sensing means, for example, such as proximity  
30 detector, a photocell, etc. which is activated by the  
presence of an article at or coming to the imprinting  
location.

It should be pointed out that although not  
shown in Figure 2, reference is to be made to Figure 4  
35 wherein there is illustrated the thin plate or mask 270

of generally rectangular dish-shaped configuration installed along with the cartridge assembly 94 functioning as supplementary sealing means for establishing a sealed engagement between the imprinting head and the ink saturated pad 114 of the cartridge 94.



CLAIMS:

1. An article imprinting apparatus (10) comprising imprinting head means (150) carrying type face means (178) for applying an imprint to the surface of an object (43), inking cartridge means (94) having an exposed inking surface (114) adapted to be engaged by said type face means (178) during a rest condition, drive means (230) for translating said imprinting head means (150) between the rest condition and an imprinting position angularly displaced approximately ninety degrees of arc from the inking cartridge means (94) and return, and linkage means including a drive link (190, 192) pivotally mounted at one end to a stationary pivot point (218) and at the opposite end to a movable pivot point (158) and a drive plunger (222) for actuating said drive link, said imprinting head means (150) being coupled to the movable pivot point (158) whereby to effect the translation, and guide means (200, 202, 206, 204, 212) for controlling the rotation of said imprinting head means (150) about the movable pivot point (158), said imprinting head means (150) being rotated simultaneously with the translation thereof along said path, characterised in that said guide means comprises cam (212) and follower (204, 212) means, said follower (204, 212) means being pivotally mounted to said imprinting head means (150) at a location offset from the movable pivot point (158) and movable therewith during translation of the imprinting head means (150), said imprinting head means (150) being rotatable about the movable pivot point at a constant rotational acceleration relative to the drive link, the velocity of rotation of the imprinting head means being uniform at the locations proximate the ends of the translation strokes, with the velocity of rotation increasing in accordance with the uniform rotational acceleration to the midpath of the strokes, and decreasing under uniform deceleration to

locations proximate the end of the strokes.

2. The imprinting apparatus as claimed in claim 1 wherein said cam means (212) comprises slot means (212) defining a path for effecting the constant rotational acceleration of said imprinting head means (150) and said follower means (204, 200) comprises shaft means (204) carried by said imprinting head means (150) and bushing means (206) mounted on said shaft means (204) and seated within said slot means (212), the initial rate of rotation and the terminal rate of rotation during translation of the imprinting head means (150) results from following a path which defines a parallelogram.

3. The article imprinting apparatus as claimed in claims 1 or 2, wherein said imprinting head means (150) includes a type holder (170) and means (162, 164, 166) coupled to the type holder to permit limited inertial extension of the type holder upon the imprinting means reaching the limit of at least the imprinting stroke.

4. The article imprinting apparatus as claimed in any preceding claim, wherein an eccentric mounting means (236, 250) is provided for pivotally mounting said drive means on an eccentric axis and means (264, 262) for selectively shifting the degree of eccentricity of said last mentioned pivot mounting whereby controllably to shift the end points of the imprinting and return strokes during the operation of the apparatus.

5. The article imprinting apparatus as claimed in any preceding claim, wherein there is provided means (255) to stop the imprinting stroke of the imprinting head means at a location just prior to reaching the imprinting position.

6. The article imprinting apparatus as claimed in claim 1, wherein there is provided eccentric mounting means (236, 260) for said drive means and means for shifting (262, 264) of the eccentric mounting axis linearly to change the end points of the imprinting and return strokes.

7. The article imprinting apparatus as claimed in claim 6, wherein said eccentric mounting means includes a rockable plate (236), said plunger means (222) being mounted to said plate, means (260, 258) for pivotally mounting said rockable plate on the eccentric axis and means for selectively shifting (262, 264) the mounting axis of said rockable plate to shift the terminus of the said strokes during the operation of said apparatus.

8. The article imprinting apparatus as claimed in any preceding claim, wherein said imprinting head means (150) includes a type holder (170) and sealing mask means (270, 108) engaged over the exposed inking surface (116) of the inking cartridge (44) within the apparatus, said sealing means including inner linear means (108) adapted to be engaged by said mask means (270) and said type holder engaging said mask (270) to establish and maintain said sealed engagement of the imprinting head means in the rest condition.



FIG. 3

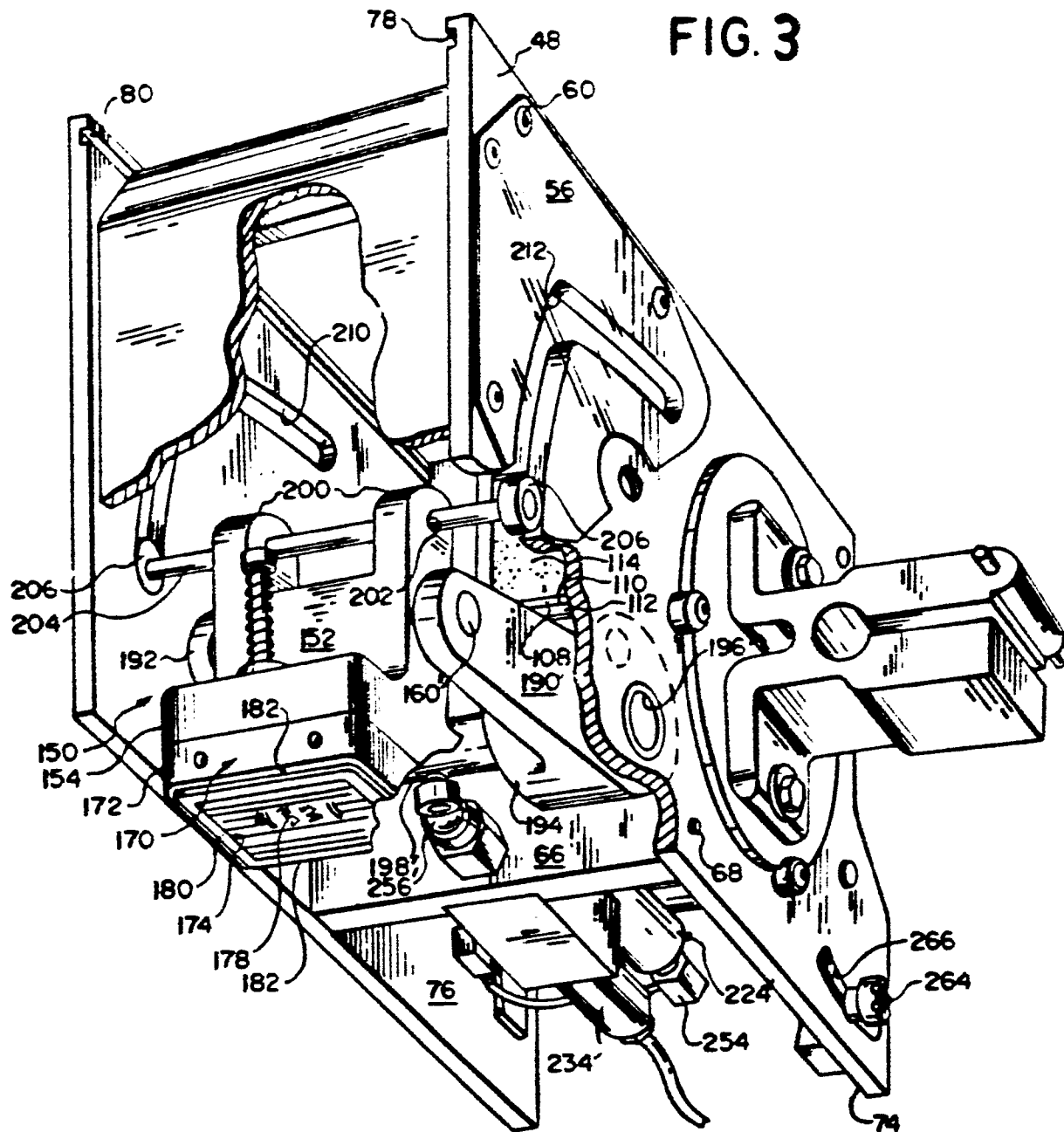


FIG. 4

