Feb. 8, 1955 J. G. McKAY 2,701,519

PRINTING DEVICE HAVING AUTOMATIC SYNCHRONIZING MECHANISM

Filed July 14, 1954 2 Sheets-Sheet 1

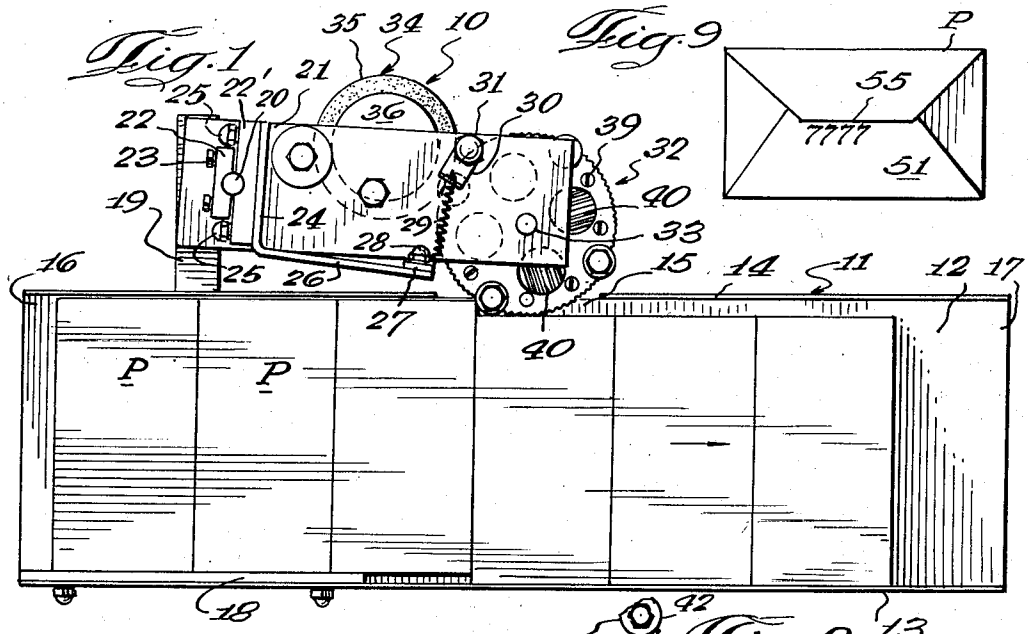


Fig. 1

Fig. 9

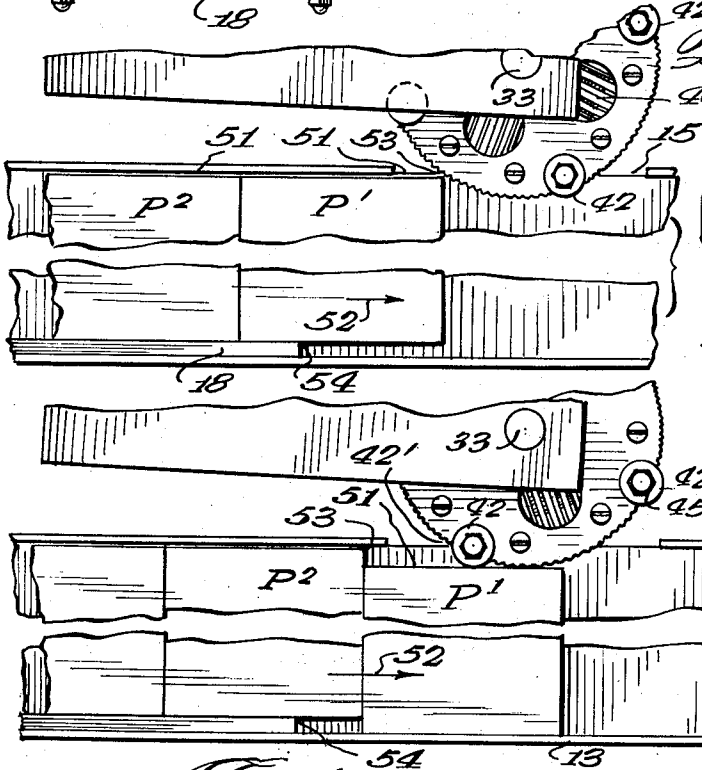


Fig. 2

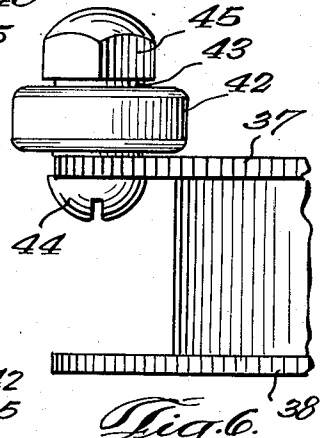


Fig. 6.

Fig. 3.

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Fig. 4.

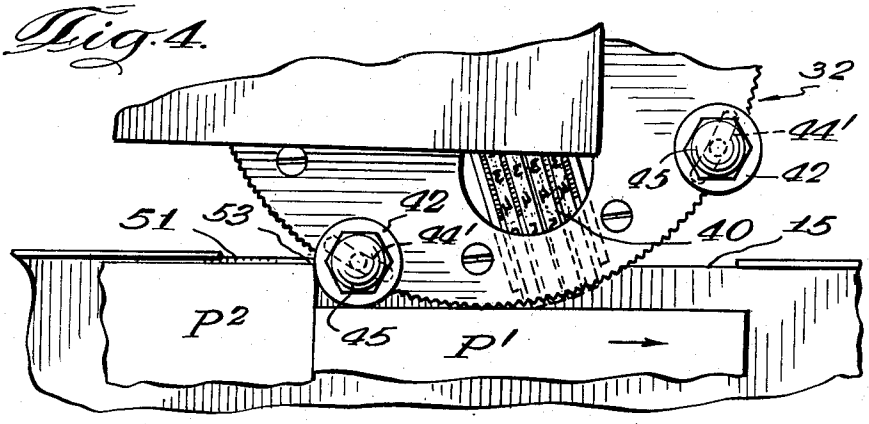
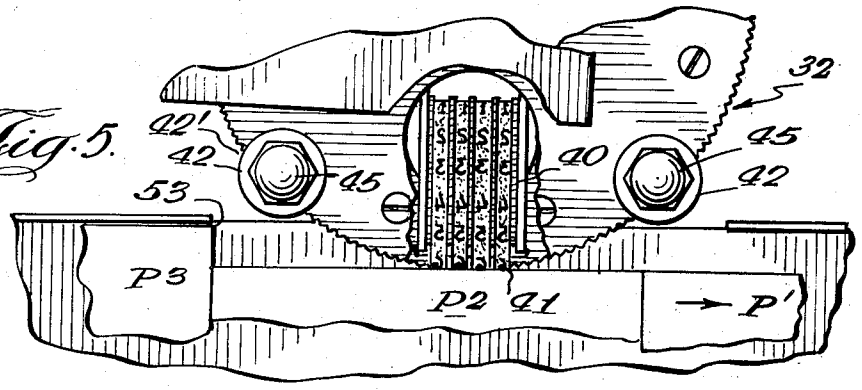


Fig. 5.



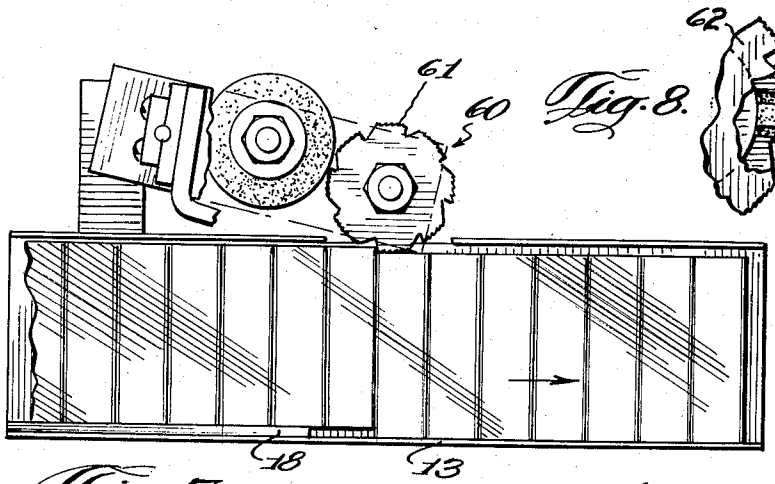
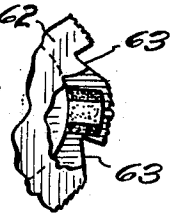


Fig. 7.

Fig. 8.



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2,701,519

PRINTING DEVICE HAVING AUTOMATIC SYNCHRONIZING MECHANISM

James G. McKay, Chicago, Ill.

Application July 14, 1954, Serial No. 443,227

17 Claims. (Cl. 101—35)

This invention relates to the construction of a printing device for applying numbers to packages moving in a line past the device and more particularly, relates to such a device having novel synchronizing means whereby automatically to cause imprinting on each package at an identical predetermined location thereon.

Reference may be had to my Patents No. 2,562,627 for an "Adjustable Inking Device" and No. 2,634,676 for a "Device for Printing Characters on Moving Packages" for an explanation of the general character of device with which this invention is concerned and the construction of certain parts of the patented devices which are employed in this invention.

In the printing of code dates or other characters on individual packages of a line moving past the printing device, an immediate problem is the application of the imprint upon each package at the same location thereon without interfering with the continuous progress of the packages and the rapid operation of the printing devices. The location of the imprint is important since it must be readily visible and not obliterated or otherwise rendered illegible by reason of other text material imprinted on the package. To effect proper printing, heretofore there have been available various synchronizing mechanisms which in their operation cause the printing wheel of the device to assume or return to a predetermined position relative to the line of movement of the packages after each imprint. Such a synchronizing mechanism is described in my Patent No. 2,595,279 for a "Printing Mechanism Synchronizer."

These and other mechanisms require a considerable number of parts, must be adjusted from time to time, are slow, and in many cases will not provide proper synchronization when packages are moved past in a continuous face-to-face line. Since the packages are usually frictionally engaged, continuous frictional engagement can overcome the synchronizing means. Accordingly, it is a principal object of this invention to provide a printing device having an automatic synchronizing mechanism which will attain distinct advantages over the prior art devices and effect rapid and efficient printing on packages moving in a line through the device.

Another object of the invention is to provide a device of the character described having a rotatable printing wheel bearing a plurality of printing points circumferentially spaced thereon, the synchronizing means being associated with said printing wheel enabling the synchronized printing of packages moving past the device in a continuous, face-to-face line.

A further object of the invention is to provide a printing device as described having a novel trough into which the packages are fed; said trough having means providing a pair of paths along which the packages move through the device, the paths of movement being offset one from the other and the imprint being applied while the packages are moving along one of the paths.

Still another object of the invention is to provide a printing device of the character described having a novel synchronizing mechanism associated with the printing wheel of the device for synchronizing the printing points on said wheel with respect to a surface of each package whereby to have the imprint applied on a predetermined location on said surface which is identical for each package.

Another object of the invention is to provide a printing device as described which is capable of being mounted for operation either as part of a conveyor belt system for carrying the packages to and from the device or associated

with a packaging apparatus to receive the packages directly from the packaging apparatus or which may be installed in other ways by reason of its versatile construction.

Still a further object of the invention is to provide a device of the character described in which means are provided to enable the printing wheel to be stopped while the line of packages is moving past the same, for a sufficient time to effectuate perfect synchronization with the passage of a single package.

An additional object of the invention is to provide a printing device of the character described which is readily adjustable for imprinting on packages of varying sizes, and as to location at which the imprint is applied.

Other very important objects of the invention reside in substantial reduction in the number of parts employed to obtain the advantages alluded to hereinabove, the simplicity and economy of construction, durability of structure, all without sacrificing speed and efficiency of operation of the device.

These and other objects of the invention will become apparent as the description thereof proceeds, in connection with which a preferred embodiment has been described in detail and is shown in the accompanying drawing. It is contemplated that minor changes in size, arrangement, construction and proportion of the various parts are within the abilities of the skilled worker in the art without departing from the scope or sacrificing any of the advantages of the invention.

In the drawings, where the same characters of reference are employed to designate corresponding or similar parts of the invention throughout the various figures thereof:

Fig. 1 is a plan view of the printing device embodying the invention and showing same in operation with a line of packages moving through the same.

Figs. 2 through 5 are fragmentary plan views of the printing device, each view showing the relative position of the package, the printing wheel and the manner of synchronizing the said wheel in various stages of operation of the device.

Fig. 6 is a fragmentary plan view of said printing wheel and showing said synchronizing means.

Fig. 7 is a plan view of a modified form of the invention.

Fig. 8 is a fragmentary side elevational view of the printing wheel of said modified form of the invention.

Fig. 9 is a plan view of a side or end of the package on which the imprint has been applied.

Generally, the invention may be seen to comprise a compact printing device which may be mounted in position for use in a variety of ways. Same may be inserted as part of a conveyor belt system whereby the packages are pushed onto the device, the imprint applied and thereafter pushed onto the reach on the opposite side of the device to be carried away. Also, the device embodying the invention is capable of being mounted adjacent a packaging apparatus so that the packages are loaded onto the device for imprinting directly from the packaging device. By reason of the construction of the device as hereinafter described, it will be seen that same is capable of being mounted in a variety of manners, it not being deemed necessary to show the same in the drawings since these will occur to the skilled workman and be readily understood.

The invention comprises, in combination, a trough or tray along which the packages are moved, a freely rotatable printing wheel having a plurality of equally radially spaced printing points along its periphery and apparatus associated with the printing wheel which by reason of the cooperation therebetween effects synchronization of the printing wheel for application of the imprint at a precise predetermined location on each of the packages. The construction of the trough also contributes to automatic synchronization, same being constructed so as to provide at least two paths offset one from the other along which the packages are moved. The printing wheel normally is biased so that a portion thereof extends considerably into the path of movement of the packages along one of said paths. A package moving along said one path presents a leading edge which first engages the periphery of the printing wheel while moving with the side to be printed, aligned with a chord of the printing

wheel. When the lead edge engages said wheel, it raises the same out of the path of movement, causes rotation of the wheel and then the package is translated to the second path where the imprint is applied. Synchronization of the printing wheel is accompanied by an almost imperceptible oscillation or rocking of the printing wheel in a plane normal to its axis of rotation which causes the same to assume proper printing positioning of a printing point on the said wheel and application of the imprint at the predetermined location on the package. This operation is continuous, namely, synchronization is automatic and is not affected by any variation in the spacing between packages which may occur as they are moved through the device.

The synchronization is accomplished through the use of a plurality of rollers mounted on the wheel with portions protruding beyond the circumference of the wheel so that when a package side engages the wheel moving along its second path, the wheel will rotate until the roller comes into contact with said side. Further rotation of the wheel would carry the roller to a position tending to push the wheel away from the package side or end, but instead of this occuring, the roller rotates and the wheel drops back in reverse rotation until once more the periphery of the wheel frictionally engages the package end or side. This is continued as a slight rocking of the wheel, until some force is applied to cause further rotation of the wheel.

The application of force must push the roller around past the package ends, raising the wheel off the package ends, and hence must be fairly strong. The invention contemplates that when the leading edge of the first package on the entrance path engages the wheel periphery, it will enter a notch formed by the periphery and a roller. The package being pushed by others coming out of the packaging device or along the line, applies the necessary force to turn the wheel to the next printing position and roller. It is preferred that the distance from notch to notch, measured circumferentially is exactly the length of the package surface being printed, but this is not essential. Where the distance between notches is less than the length of printed surface, as the line moves past the printing wheel it will rock, that is, mark time without rotating until the next notch is engaged by the following package.

Adjustment of position of imprint is obtained by moving the positions of the rollers circumferentially relative to the printing point.

Referring now to the drawings, the reference character **10** designates generally to the printing device embodying the invention. Same includes a trough designated of generally channel-shape, said trough having a bottom wall **12**, and a pair of side walls **13** and **14** connected thereby. The wall **14** is provided with an opening **15** intermediate the ends of the trough. The ends of the trough are open providing an entrance **16** and an exit **17**. Secured to the inner surface of wall **13** by suitable bolts is a plate member **18** which extends from the entrance **16** to point on said wall short of the space **15**. The distance between plate **18** and wall **14** is sufficient to accommodate a package P.

It is intended that the packages P be fed to the trough through entrance **16** and moved along with a side or end thereof engaging the plate **18**. Accordingly, the plate **16** provides an entrance path which will be seen to be offset from the plane of the wall **13**, which provides the path of movement of said packages to the exit **17**.

To the wall **12** is secured a standard having a portion **19** extending beyond the wall **14**, said portion having a shaft **20** secured thereon at right angles thereto. Pivotally mounted on the shaft **20** is a supporting plate **21** for the inking and printing wheels of the device. The plate **21** is mounted adjacent one end thereof on a sleeve or bushing (not shown) engaged on shaft **20** so as to be pivotal and held in place by means of the cooperating clamping bars **22** and **22'** secured together by bolts **23**. The plate **21** is arranged in a plane spaced from the wall **14**. Secured to clamp bar **22'** is one leg of an L-shaped bar **24** by bolts **25** threaded through clamp bar **22** into said leg, the other leg **26** extending outwardly of bar **22**. Attached on the extremity of leg **26** is an ear **27** by means of bolt **28**, one end of spring **29** being secured to said ear **27** while the opposite end of the spring is secured to an ear **30** attached on plate **21** by bolt **31**.

Mounted adjacent the opposite free end of plate **21** is a printing wheel designated generally **32**. The particular construction of said wheel is described in my Patent 2,634,676. Same is mounted for free rotation on a shaft **33** carried by the plate **21** for that purpose, and retained against axial movement by any well-known means (not shown). The inkling wheel of the device is designated generally **34** and also is mounted for free rotation on the plate **20**. Said inkling wheel may be of the same general construction as described in my Patent 2,562,627 and may consist of a porous disc **35** retained between a pair of sandwiching discs, one of which is shown at **36**. The disc **35** is arranged opposite the circumferential edge of the printing wheel so as to rotate against the type of said wheel for inking same. Of course, the inking wheel is rotated by the rotary movement of the printing wheel.

Considering said wheel **32**, same consists of a pair of plates, portions of which are shown at **37** and **38** in Fig. 6, held together in spaced parallel relationship by means of spacer members, the securing screws for which are shown at **39**. The edges of the plates **37** and **38** are milled in order to assure a gripping of the surface of a package P on which the characters are imprinted. The plates mount a plurality of numberers **40** therebetween, the printing surfaces of which may be brought to face the circumference of the printing wheel and have the type **41** thereof protruding slightly beyond the peripheral edge of the printing wheel. It will be seen that as the printing wheel rotates, the type at the top thereof will be inked by the inking wheel while the type at the bottom will be applying an imprint to the package.

Mounted on the plate **37** are a plurality of rollers, each roller **42** being mounted on a sleeve **43** carried on screw or bolt **44** extending through plate **37** and retained thereon by headed nut **45**. The rollers are freely rotatable and there are as many rollers as there are numberers. Each roller is positioned approximately midway between a pair of numberers and is rotatable about an axis spaced slightly inwardly of the peripheral edge of plate **37** so that the peripheral edge of each roller protrudes beyond the peripheral edge of said plate. The rollers **42** are arranged to cooperate with the circumference of the printing wheel to effect synchronizing of the printing surfaces of the numberers to imprint at a predetermined spot on the packages. Adjustment of position of the rollers relative to the printing points may be achieved by means of slots **44'** (Fig. 4) along which the rollers may be secured after loosening and moving said bolts **44**.

Referring to Fig. 1, it will be seen that printing wheel **32** is positioned opposite opening **15** in wall **14** and due to the size and tension of spring **29**, normally is biased to extend into said opening **15** in the path of movement of the packages along plate **18**.

The operation of the device **10** may be considered in two phases. Considering first Fig. 2, a line of packages P has been fed onto the plate **18**, the first package of the line being called P^1 and the next package being called P^2. It is desired to imprint on the ends **51** of said packages. As package P^1 moves along said entrance path in the direction of arrow **52**, its leading edge **53** will come into engagement with the milled edges of the printing wheel **32**. It should be noted that as shown in Fig. 2, the wheel **32** is not synchronized for printing and its printing points provided by numberers **40** will not print properly on the surface **51** of each package P but be off to a side. When package P^1 first engages the printing wheel, it will still be engaged against plate **18** but prevented from moving to wall **13** by reason of its engagement between plate **18** and wall **14**. As the package P^1 continues its forward progress, it will rotate the wheel **32** in counterclockwise direction and simultaneously pivot the same in a direction away from the opening **15** against the bias of spring **29**. The plate **21** will thereupon pivot in a direction away from the trough **11** and cause a roller **42** to engage against the surface. The package P^1 will then be enabled to slide forwardly beneath said roller without the printing wheel being rotated. Instead, the wheel **32** will rock back and forth in a plane normal to its axis of rotation, as explained.

In Fig. 3, the package P^1 has moved forwardly in the direction of arrow **52** a sufficient distance to be translated onto the wall or the exit path of movement. The drop-off point between plate **18** and wall **13** is designated **54** which is spaced to the rear of the printing wheel **32**. The wheel **32** is biased downwardly to engage against surface **51** and as shown in Fig. 3, both the milled edges of the wheel **32** and a roller **42** are engaged against surface **51**.

It will be obvious that now, as the package P^1 moves to the right, the printed end **51** (as well as the printed end

51 of all later packages moving to the right of the wheel and down the trough) will be in a plane tangential to the periphery of the printing wheel 32 while the wheel is in the condition shown in Figs. 3, 4 or 5. The packages to the left of the wheel, however, are on a different offset path, and their ends 51 lie in a plane which is aligned with a chord of wheel 32 while the wheel is in printing position. As previously described, the position of the wheel 32 illustrated in Fig. 3 will be maintained, as the package P^1 moves past, so long as no additional force is applied to the wheel 32 to turn the same. Note that the peripheral edge of the wheel 32 and roller 42 define a notch 42' aligned with the plane of ends of package P^2 and following.

Referring to Fig. 4 for the second phase of operation, the package P^2 has now moved forwardly so that its leading edge 53 is engaged against a roller 42 and in notch 42'. Forward movement of package P^2 will now apply a force on a chord of wheel 32 forcing same to rotate in a counterclockwise direction and pivoting same out of opening 15. In its forward movement, the package P^2 thereupon swings the wheel 32 so as to cause the roller to ride upon surface 51 of package P^1 past the bottom of the wheel and start around up the other side. In the meantime, package P^2, in engagement with the milled edge to the left of the roller follows the rotation of the wheel, is translated to the exit path, and in the condition illustrated in Fig. 5 is imprinted. The package P^2 is translated to the exit path of wall 13 by the normal bias exerted by spring 29 on wheel 32. In Fig. 5, the package P^2 is receiving the imprint from numberer 40 as it moves in the direction of the arrow and likewise, package P^3 is moving forwardly to enable its leading edge 53 to engage against roller 42 in the next notch 42'.

It will be noted that after the first package P^1 is moved past the wheel 32, all the subsequent packages will have their imprinted surfaces 51 in synchronization with a printing point on the wheel at the time of imprint. This is readily apparent from Figs. 4 and 5, where once the package P^2 which is second in line, engages the printing wheel and a roller 42 thereon, synchronization will be automatic thereafter since it is initiated when the leading edge 53 of a package engages the printing wheel. When a package is translated to the wall 13, it receives the imprint by engaging the protruding type 41 and rotating the wheel and thereafter, moves toward the exit 17.

As shown in Fig. 9, the imprint 55 has been applied to an end 51 of the package P. Adjustment in the vertical position of the imprint on the package may be had merely by raising or lowering the plate 21 with respect to the trough. This, of course, can be done by adjusting the clamp bars 22 and 22'. Adjustment along the line of movement is accomplished by changing positions of the rollers relative to printing points.

Referring to Figs. 7 and 8, there is shown a modified form of the invention designated generally 60. The trough, supporting plate, and inking wheel of the device 60 are identical to that of the embodiment heretofore described. However, the printing wheel 61 of this modified form is changed. Same includes a pair of plates, one of which is shown at 62, assembled in spaced relationship and with numberers or type mounted therebetween in the same manner as printing wheel 32. However, instead of rollers, the peripheral edge of each plate is notched at a plurality of points therealong. There is a notch 63 on each side of the numberer 40. The operation of the device 60 is the same as heretofore described in connection with the preferred embodiment. The leading edge of a package 11 engages a notch when moving along the plate 18 rotating the printing wheel 61 in a counter-clockwise direction and raising same. The package then drops onto wall 13 where the imprinting takes place and then continues its movement out from under the printing wheel.

Synchronization is accomplished by relative movement between packages and the notches 63. With the notches open to approaching packages, the packages will slide slightly in the notches to provide proper alignment. In acquiring synchronization, there may be several packages passing through the device before the proper alignment with the notches is achieved, but once achieved such alignment is maintained.

It will be seen that I have provided a printing device which by reason of the cooperation between the trough, the printing wheel and the synchronizing apparatus associated with the printing wheel, there is effected an automatic synchronizing of the wheel to apply the imprint at the same predetermined location on the packages. The equipment is very simple and does not necessitate a large number of parts. For instance, the addition of the rollers to the printing wheels or the notching of the peripheral edges of the plates thereof does not contribute unduly to the expense of the device. Providing the trough with a pair of paths along which the packages move also can be done economically. It will be seen that the results accomplished by the invention may be attributed to the cooperation between the structural elements without increasing the cost of the device prohibitively.

It is believed that the invention has been described in sufficient detail to enable same to be understood and practiced in accordance with the requirements of the patent laws. It is intended that the invention be construed in such broad scope commensurate with the advance in the arts contributed thereby as set forth in the claims hereto appended.

I claim:

1. A printing device for applying an imprint on individual packages moving in a line through the device and at an identical predetermined location on each package, comprising, in combination, a trough having entrance and exit at opposite ends thereof, means defining an entrance path along which said packages move in alignment, means defining an exit path along which said packages move in alignment, the two paths being offset one from the other requiring packages to be translated from one path to the other in passing through said trough, and a rotatable printing wheel having a plurality of equally circumferentially spaced printing points and having its axis pivotal relative to the trough and biased to move the printing wheel against the sides of the packages moving through the trough in the vicinity of translative movement of said packages from path to path, said wheel having means cooperative with the first package on the entrance path and the last package on the exit path to synchronize the positions of the printing points with the said sides of the moving packages.

2. A device as described in claim 1 in which said last mentioned means comprise a plurality of rollers each having their peripheral edges protruding beyond the peripheral edge of the wheel.

3. A device as described in claim 1 in which said last mentioned means comprise a plurality of rollers each having their peripheral edges protruding beyond the peripheral edge of the wheel, the number of said rollers and printing points being equal.

4. A device as described in claim 1 in which said last mentioned means comprise a plurality of notches each opening to the peripheral edge of said wheel, and there is a notch on each side of a said printing point.

5. A device as described in claim 1 in which the bias of said printing wheel effects the translative movement.

6. A printing device for successively applying an imprint on the packages of a line of packages moving through the device and at an identical predetermined location thereon comprising, a channel-shaped trough having ingress and egress at opposite ends thereof, means defining an entrance path along which the packages move in alignment, means defining an exit path along which the packages move in alignment, the two paths being offset one from the other requiring the packages to be translated from one to the other in their passage through the trough, said trough including a wall spaced from said paths of movement having an opening therein intermediate said ends, and a freely rotatable printing wheel having a plurality of equally circumferentially spaced printing numberers and pivotally mounted with respect to said paths, said wheel being spring biased normally to extend through said opening against the sides of the packages moving through the trough in the vicinity of translative movement of said packages from path to path, said wheel having means cooperative with the first package on the entrance path and last package on the exit path to synchronize the positions of the numberers with said sides of the packages.

7. A device as described in claim 6 in which the imprint is applied to the package while moving along said exit path.

8. A device as described in claim 6 in which said first package presents an edge thereof engageable with said last mentioned means and exerting thereagainst a force

along a chord of said wheel immediately after application of the imprint on the said last package.

9. A device as described in claim 6 in which the means defining said exit path is a side wall of said trough.

10. A device as described in claim 6 in which the means defining said exit path is a side wall of said trough, and the means defining said entrance path is an elongate, flat member secured on the said side wall.

11. A device as described in claim 6 in which said last mentioned means comprise a plurality of circumferentially spaced, roller members, each roller is positioned between a pair of said printing points and has its peripheral edge protruding beyond the printing wheel.

12. A device as described in claim 6 in which said last mentioned means comprise a plurality of notches in the peripheral edge of said wheel, the number of notches exceeding the number of printing numberers.

13. A device as described in claim 6 in which said trough has a standard extending beyond said wall having the opening, a supporting member pivotally mounted on said standard with its axis of pivot normal to said paths of movement, and said wheel is mounted on said supporting member.

14. A device as described in claim 6 in which said trough has a standard extending beyond said wall having the opening, a supporting member pivotally mounted

on said standard with its axis of pivot normal to said paths of movement, and said wheel is mounted on said supporting member, and there is an inking device rotatably mounted on said supporting member facing the circumference of said printing wheel and adapted to ink said numberers.

15. A device as described in claim 3 in which the circumference of said wheel divided by the number of printing points is not less than the dimension of the printed package end measured along the line of movement thereof.

16. A device as described in claim 1 in which said last mentioned means comprises a plurality of circumferentially spaced notches along the periphery of said printing wheel arranged to be sequentially engaged by packages moving along said entrance path.

17. A device as described in claim 1 in which said last mentioned means comprises a plurality of circumferentially spaced notches along the periphery of said printing wheel arranged to be sequentially engaged by packages moving along said entrance path, the positions of said notches being adjustable in a direction along an arc of said wheel.

No references cited.