March 1, 1938. W. D. KIMBALL 2,109,590

PRINTING MACHINE

Filed May 2, 1935 2 Sheets-Sheet 1

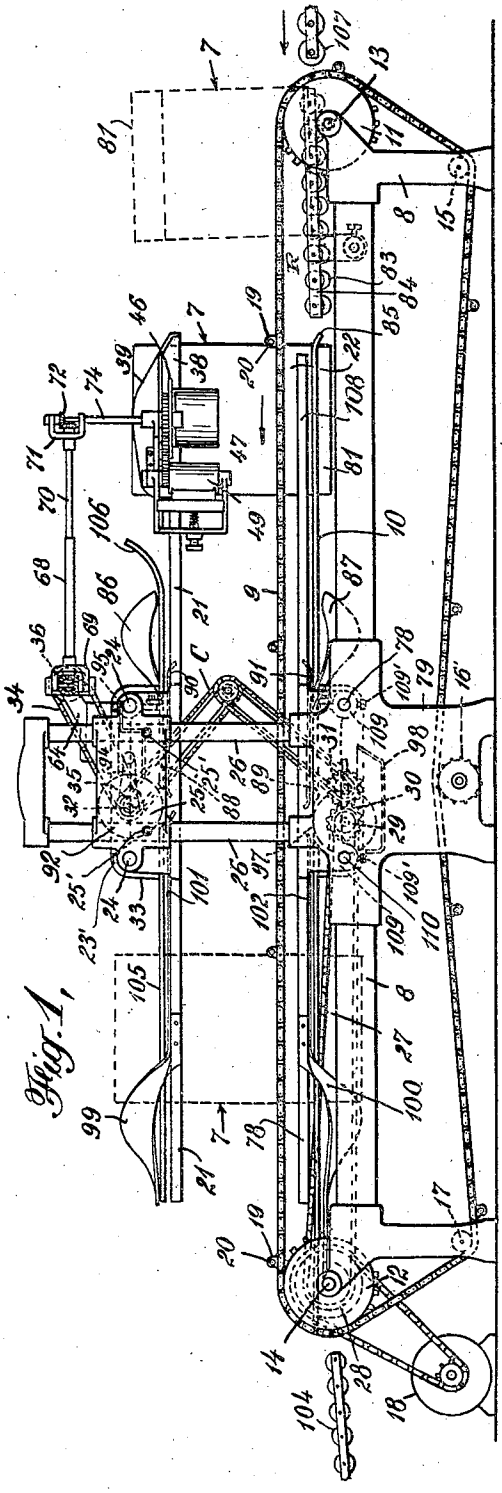


Fig. 1.

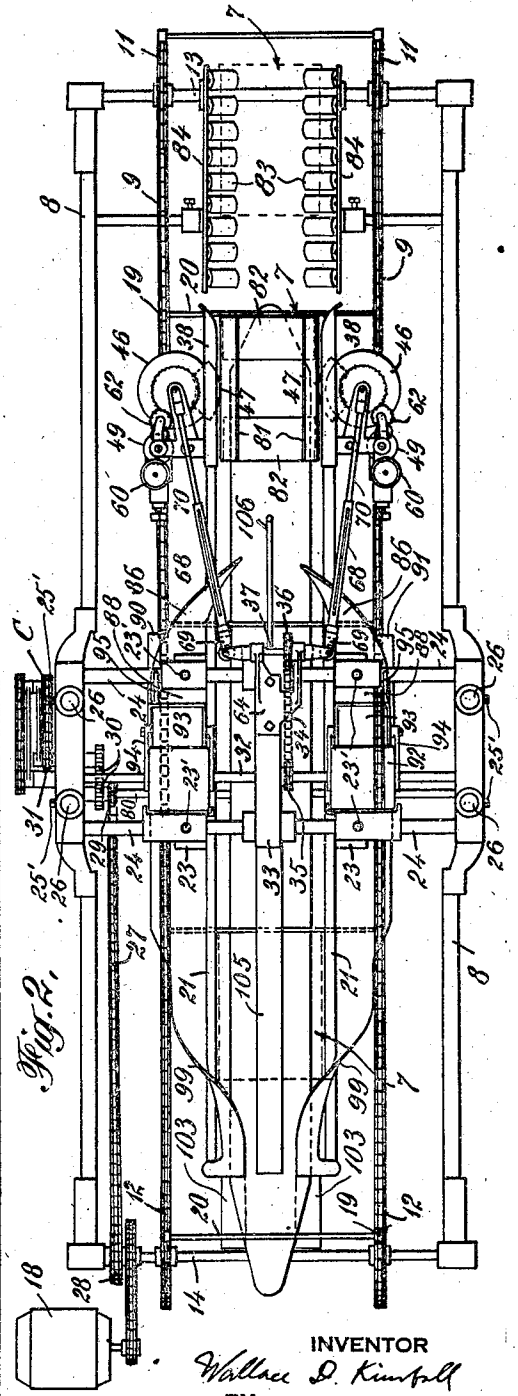


Fig. 2.

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Fig. 3,

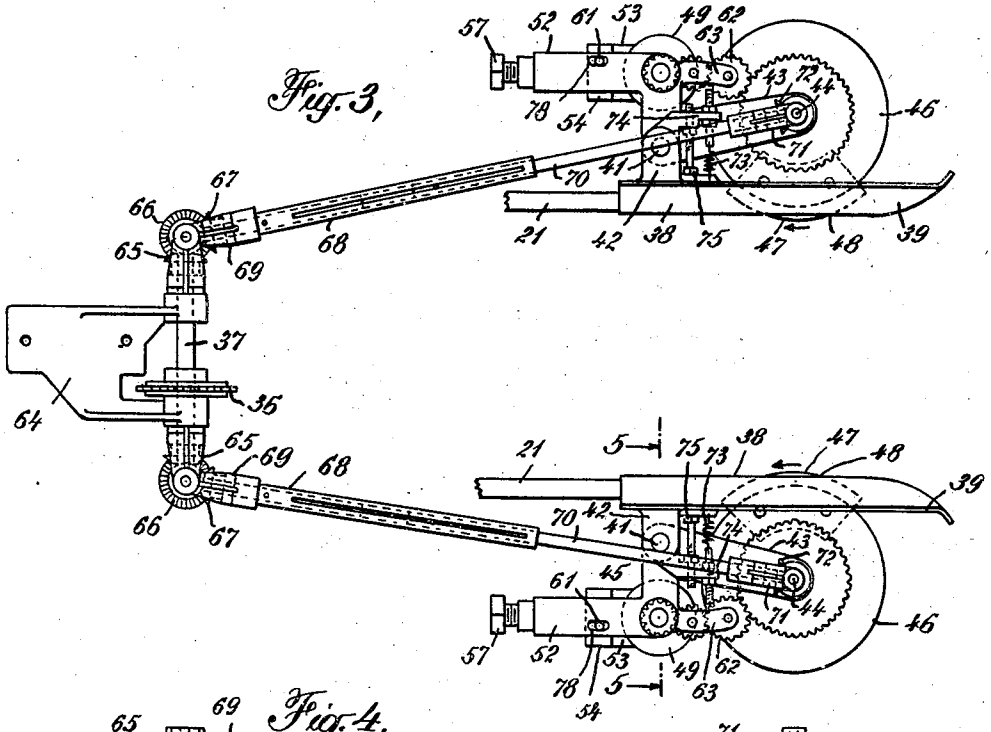


Fig. 4,

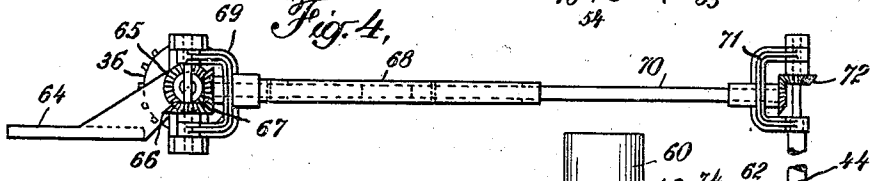
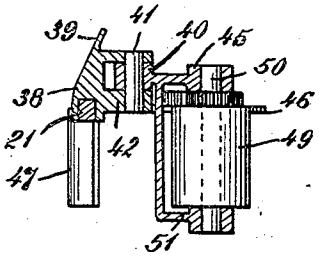


Fig. 5,



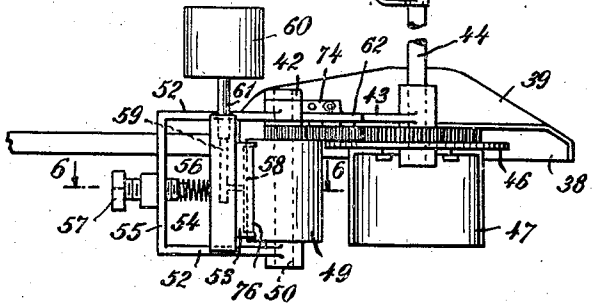
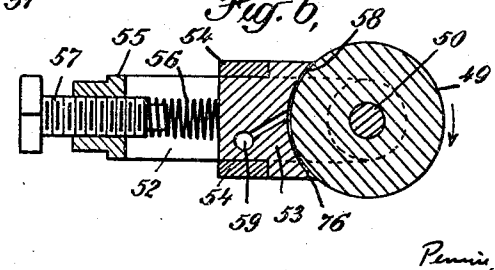


Fig. 6,



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Patented Mar. 1, 1938

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UNITED STATES PATENT OFFICE

2,109,590

PRINTING MACHINE

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Application May 2, 1935, Serial No. 19,375

3 Claims. (Cl. 101—36)

This invention relates to a printing machine and more particularly concerns improved apparatus for printing a name, label, number or other mark on the surface of a package, carton or other container.

In the packing of articles such as canned goods, soap, cereal packages and the like, it is desirable that a name, label or other mark be fixed to the outer carton or other wrapping. This may be most economically accomplished by printing the required mark directly on the outer wrapping during the packaging process. Previously known means for printing labels or marks on packaged goods have been unsatisfactory in certain respects. Particularly in the packaging of goods in cartons, it is necessary that the printing be applied to the side walls or other vertical surfaces of the cartons or packages. This requires a vertical type cylinder or equivalent printing means, and in the past, it has been impossible to obtain a satisfactorily uniform distribution of ink on a vertically disposed type surface of this nature.

The present invention contemplates the provision of an improved printing machine for use in printing labels, names or other marks on the cartons or wrappers of packaged goods. A particular object of the invention resides in the provision of printing mechanism of this nature which is capable of rapidly printing any desired mark on vertical walls or surfaces of moving cartons or packages, and in which an even distribution of ink on the vertically disposed type surfaces is obtained with simple, reliable and inexpensive apparatus.

While my improved printing mechanism is particularly suitable for printing on vertical walls of cartons, boxes and the like, for which purpose no satisfactory machine has heretofore been designed, it may also be used with advantage for printing upon any surface regardless of the angle of the surface to the horizontal.

A further object of the invention is the provision of a carton or package handling machine embodying label printing and flap opening and closing mechanism which is readily adjustable to adapt the machine to accommodate cartons of various sizes.

In general, the above and other objects of my invention are carried out by providing a cylindrical type sector or surface rotating about a vertical axis and disposed to engage a vertical wall or surface of a moving package or carton. The type surface is inked by an inking cylinder disposed to be engageable therewith during the rotation thereof, and an improved ink feeding mechanism is employed to apply the ink uniformly to the inking cylinder and so to the vertical type surface.

The invention will be best understood by reference to the accompanying drawings in which a typical embodiment thereof has been illustrated. In the drawings;

Figure 1 is an elevation of a carton or package handling mechanism embodying my improved printing machine;

Figure 2 is a plan view of the apparatus shown in Figure 1;

Figure 3 is an enlarged plan view of the printing mechanism and the driving means therefor;

Figure 4 is an elevation of the mechanism shown in Figure 3;

Figure 5 is a sectional view taken along the line 5—5 of Figure 3 and viewed in the direction of the arrows; and

Figure 6 is an enlarged sectional view taken along the line 6—6 of Figure 4 and viewed in the direction of the arrows.

The printing mechanism of the invention has been shown applied to a carton or package handling apparatus of the type in which cartons or packages 7 are continuously propelled horizontally while various packing and marking operations are performed thereon. Referring to Figures 1 and 2, the carton handling apparatus shown by way of illustration comprises an elongated frame or support portion 8 provided with parallel longitudinally extending propelling chains 9 at the opposite sides thereof and an elongated carton-carrying table 10 between the chains 9, as shown. Suitably supported at the entrance end of the frame 8 is a slightly inclined roll conveyor R comprising a plurality of oppositely disposed parallel rollers 83 carried by suitable side members 84 and slanting downwardly toward the center of the frame, as shown. The entrance end of the supporting table 10 is bent downward adjacent the exit end of the roll conveyor R, as shown at 85. The propelling chains 9 are endless and pass over the sprockets 11 and 12 carried respectively on the transverse shafts 13 and 14 at the opposite ends of the frame 8. The lower span of the chains 9 may be carried by idler sprockets or equivalent means 15, 16 and 17, as shown in Figure 1. The chains 9 may be continuously moved in the direction indicated by the arrows by a motor 18 or other source of power which is suitably connected as shown to drive the shaft 14 to which the chain-carrying sprockets 12 are fixed. Oppositely dis-

are fixed to the chains 9 at suitable intervals and serve to propel the cartons 7 along the table 10.

A pair of parallel longitudinally extending upper guide bars 21 are disposed above the table 10 adjacent the sides thereof in positions to engage the opposite side walls 22 of the cartons 7 as the cartons move along the table. The bars 21 are suitably supported by elements 23 which are horizontally adjustably carried on the cross rods 24 which in turn engage the two vertically adjustable members 25 carried by the two pairs of vertical rods 26 fixed to the frame 8 at opposite sides of the table 10. Similar parallel lower guide bars 108 are disposed above the table 10 in positions to engage the opposite side walls of the cartons 7 near the lower edges thereof. The bars 108 are respectively supported by the members 109 which are horizontally adjustably carried on the lower cross rods 110 extending between the frame parts 79. With this arrangement, the guide bars 21 may be vertically adjusted to accommodate cartons of different height by moving the members 25 along the rods 26. Also, the guide bars 21 and 108 may be horizontally adjusted to accommodate cartons of different widths by moving the elements 23 and 109 along the transverse cross rods 24 and 110. The members 23, 25, and 109 may be held in various adjusted positions by any suitable means such as the set screws 23' on the elements 23, the set screws 25' on the members 25 and the set screws 109' on the members 109.

Suitable means is provided for driving the printing mechanism in timed relation to the rate of movement of the carton-propelling chains 9. As shown, this means may comprise a chain or link belt 27 leading from a sprocket 28 fixed to the driven shaft 14 to a sprocket 29 connected through suitable gearing 30 to a sprocket 31. A cross shaft 32 is suitably journaled in the members 25 and in a central member 33 carried by the cross rods 24, and a flexible driving linkage C is provided between the sprocket 31 and the shaft 32. Driving power is transmitted from the shaft 32 to a shaft 37 journaled in a bracket 64 by means of a chain 34 and the sprockets 35 and 36, as shown. The driving connections between the shaft 37 and the printing mechanism proper will be hereinafter described. The sprocket 29 drives a cross shaft 80 journaled in the lower side frame parts 79.

The cartons 7 handled by the machine disclosed are preferably of the type having side flaps 81 and end flaps 82 which fold over the top and bottom surfaces of the carton. The end flaps 82 are preferably folded beneath the side flaps 81, and the side flaps 81 preferably meet at the center of the carton when folded down over the end flaps 82.

Suitable cam plates are provided for opening and closing the carton side flaps 81 as the cartons progress through the machine. The upper and lower flap opening cam plates 86 and 87 have entrance ends disposed to engage beneath the upper and lower carton side flaps 81 and these plates curve outwardly to horizontal exit portions 88 and 89 whereby the side flaps 81 are opened and turned outwardly to horizontal positions as the cartons 7 advance. Each of the upper flap opening cam plates 86 is secured to one of the transversely adjustable members 23 and each of the lower flap opening cam plates 87 is secured to one of the transversely adjustable members 25. Thus the flap opening cam plates 86 and 87 may be adjusted transversely of the machine to accommodate cartons of different widths, and since the upper members 23 are vertically adjustable with respect to the lower members 25, the vertical distance between the cam plates 86 and 87 may be varied to accommodate cartons of different height. Upper and lower horizontal side flap carrying plates 90 and 91 are disposed in parallel spaced relation to the horizontal exit portions 88 and 89 respectively of the cam plates 86 and 87, and serve to carry the carton side flaps 81 when in their open positions.

Any suitable adhesive applying means may be employed in conjunction with the flap opening and closing apparatus. As shown in the drawings, the adhesive applying means comprises cylinders 92 and 97 disposed respectively adjacent the exit ends of the upper and lower flap opening cam plates and the upper and lower flap carrying plates. As shown, the upper adhesive applying means comprises spaced cylinders 92 carried on and driven by the transverse shaft 32, together with glue boxes 93 having open sides fixed against the cylinders 92 as shown. The glue boxes 93 are held against the cylinders 92 by suitable arms 94 engaging the shaft 32, and are supported by lugs 95 bearing on the cross rod 24. The cylinders 92 are preferably movable longitudinally of their driving shaft 32, and guides 96 may be provided on the transversely adjustable members 23 for moving the cylinders 92 with these members when the machine is adjusted to accommodate cartons of different widths. The lower adhesive applying cylinders 97 are similar to the upper cylinders 92 and are slidably carried on and driven by the cross shaft 80. The lower glue boxes 98 are suitably supported beneath the cylinders 97 as shown, and the cylinders 97 and glue boxes 98 are connected to move transversely of the machine with the transversely adjustable members 109.

The side flap closing means comprises upper and lower cam plates 99 and 100 having extended horizontal entrance portions 101 and 102 which respectively terminate at the exit sides of the adhesive applying cylinders 92 and 97. The upper cam plates 99 are supported by the vertically and transversely adjustable guide bars 21 and members 23, and the lower cam plates 100 are similarly supported by the transversely adjustable guide bars 110 and members 109. The upper cam plates 99 are formed as shown to turn the upper carton side flaps 81 inwardly and close them down on the upper carton end flaps 82 as the cartons leave the machine. The lower cam plates 100 are similarly formed, but the exit portions 103 thereof are disposed to carry the inwardly folded lower carton side flaps 81 below and in spaced relation to the under surface of the exit end of the table 10. As shown in Fig. 2, the exit portions 103 of the lower cam plates 100 extend beyond the ends of the upper cam plates 99 and act to hold up the lower carton side flaps 81 until the carton passes off the exit end of the table 10 onto the roll conveyor 104.

A central upper plate 105 is carried by the member 33 and serves to hold the upper carton end flaps 82 as the carton passes through the machine. An upwardly curved rod 106 is attached to the entrance end of the plate 105 and acts to fold down the upper end flaps 82 as the upper side flaps 81 are opened.

Referring now more particularly to the printing mechanism which is best shown in Figures 3 to 6, a guide plate or extension 38 having an upwardly and outwardly flared inner surface 39 is fixed to the end of each guide bar 21 adja-

cent the entrance end of the machine. The guide plates 38 respectively carry printing mechanisms which are of identical construction and the corresponding parts of these mechanisms are accordingly designated by like reference characters. Each printing mechanism proper is carried by a support 40 pivotally secured to the guide plate 38 by the vertical pivot 41 passing through the pivot brackets 42, as shown in Figure 5. The support 40 includes an arm 43 carrying a vertical shaft 44 journaled at the end thereof, as shown in Figures 3 and 4. A disc 46 is fixed to the shaft 44 below the arm 43 and a cylindrical vertically disposed type surface or sector 47 is secured to and depends from the under surface of this disc 46. As shown in Figures 3, 4, and 5, the type surface 47 extends through an opening 48 in the guide plate 38 to a position slightly within the inner surface of the guide plate, and also extends radially beyond the periphery of the disc 46.

The pivoted support 40 carries a substantially vertically disposed rotary inking cylinder 49 having a shaft 50 journaled in the arms 45 and 51 of the support 40 as shown in Figure 5. The inking cylinder 49 is preferably formed of a suitable metal such as steel. An inking block bracket comprising upper and lower horizontal arms 52 connected by a vertical end member 55 extends radially outward from the inking cylinder shaft 50 approximately at right angles to the supporting arms 45 and 51, and carries an inking block 53. The inking block 53 is mounted to slide radially toward and away from the cylindrical surface of the inking cylinder 49 by means of two parallel guides 54 fixed to the opposite sides of the block 53 and extending beyond the upper and lower ends thereof into embracing engagement with the opposite edges of the upper and lower arms 52 of the bracket. The block 53 is pressed against the surface of the inking cylinder 49 by a spring 56 compressed between the block and the inner end of an adjustable bolt 57 threaded through an opening in the end member 55 of the block bracket.

The inner surface of the inking block 53 is arcuate and is of the same radius of curvature as the inking cylinder 49 whereby a snug engagement between the block and the cylinder is obtained. The arcuate surface of the block 53 engages the cylindrical surfaces of the inking cylinder 49 adjacent the top and bottom of the block only, the central portion of the arcuate block surface being recessed across the block as shown at 58. The recess 58 is very shallow and may have a depth of approximately three thousandths of an inch whereby a very thin inking cavity is provided between the block and the inking cylinder. An ink supplying passage 59 is formed through the block 53 from the upper surface thereof to a point within the recess 58, and an ink reservoir 60 disposed above the block is connected to this duct by a pipe 61 passing through a slot 78 in the upper frame 52 of the inking block supporting bracket.

The inking cylinder 49 is parallel to the cylindrical type surface 47 and is disposed to engage with the type surface as it rotates. Suitable means are provided for rotating the cylindrical type surface 47 and the inking cylinder 49 at the same peripheral velocity. As shown in Figure 3, a gear train 62 is carried by a support 63 extending from the arm 45 and the gears are arranged as shown to turn the inking cylinder 49 and the cylindrical type surface 47 in opposite directions at the same peripheral velocity. The directions of rotation of the cylindrical type surface 47 and the inking cylinder 49 are indicated by the arrows in Figure 3.

The edge of the inking block 53 at which the cylindrical surface of the inking cylinder 49 passes under the arcuate surface of the block is preferably tapered inwardly toward the recess 58, as shown at 76 in Figure 6. This tapered entrance edge causes the excess ink carried by the inking cylinder to crowd back into the ink cavity formed by the recess 58 as the inking cylinder rotates.

Each printing mechanism is preferably spring-pressed inwardly toward the side walls 22 of the cartons 7 passing between the guide plates 38. To this end, an adjustable tensioned spring 73 is connected between an extension 74 on the arm 43 and the outer surface of the guide plate 38, as shown in Figure 3. An adjustable stop 75 is fixed to the extension 74 and bears against the outer surface of the guide plate 38 to limit the movement of the arm 43 and the cylindrical type surface 47 carried thereby.

Driving power is delivered to the printing mechanisms from the horizontal shaft 37 to the vertical shafts 44 by a suitable flexible driving connection. As shown, each end of the shaft 37 is connected through three bevel gears 65, 66, and 67 to a hollow shaft 68 which is supported from the shaft 37 by the universal yoke 69. A shaft 70 extends within and has a sliding driving connection with the shaft 68, and the far end of the shaft 70 is connected through the bevel gears 72 and a yoke 71 to the upper end of the shaft 44. The various driving gears and sprockets are so proportioned and arranged that the cylindrical type surfaces 47 move at a peripheral velocity equal to the rate of movement of the side surfaces 22 of the cartons advanced along the table 10.

In the operation of the described machine, cartons 7 are delivered to the roll conveyor R by suitable means such as a conveyor 107 and are advanced by the chains 9 and cross bars 20. As each carton 7 descends the roll conveyor R, its lower side flaps 81 open out slightly and rest on the inwardly slanting rolls 83. The upper side flaps of the carton are also slightly open due to the stiffness of the material from which they are formed. The top and bottom end flaps 82 remain closed due to their engagement by the partially closed overlying side flaps 81.

As the carton reaches the end of the conveyor R, the downwardly curved entrance end 85 of the table 10 passes between the slightly open lower side flaps 81 and the closed lower end flaps 82, and at the same time, the side walls of the carton pass between the guide plates 38. As the carton advances, the rotating type surfaces 47 print the desired labels, numbers or other marks on the opposite side walls of the carton. The arcuate inking cavities formed by the recesses 58 in the blocks 53 apply a layer of ink of uniform thickness to the surface of each inking cylinder 49 as it rotates, and this ink is uniformly applied to the vertically extending cylindrical type surfaces 47 as they engage the inking cylinders 49. The inking cavity formed by the recess 58 is preferably of substantial capillary dimensions, that is, this cavity is so narrow that the ink is held therein by surface tension, and as the inking cylinder 49 rotates, a film of ink is drawn from the inking cavity by the surface tension between the ink and the cylinder surface.

As the carton passes beyond the printing mechanism, the curved rod 106 holds the upper end flaps 82 closed and the upper and lower side flaps 81 are turned outwardly to horizontal positions by the upper and lower cam plates 86 and 87. The opened side flaps are held in outwardly extending horizontal positions between the plates 90 and 91 and the exit portions 88 and 89 of the cam plates 86 and 87. Adhesive is applied to the open side flaps by the cylinders 92 and 97, and thereafter, as the carton advances, the upper and lower side flaps 81 are turned inwardly by the cam plates 99 and 100. The upper closing cam plates 99 press the upper side flaps firmly on the closed upper end flaps, whereas the lower closing cam plates 100 hold the lower side flaps in spaced relation to the under surface of the table 10. As the cartons leave the table 10 and fall on to the exit roll conveyor 104, the lower side flaps are firmly pressed against the lower end flaps and the carton closing operation is completed.

With the arrangement described, the machine can be readily adjusted to accommodate cartons of various sizes. The flap opening and closing means and the adhesive applying means can be adjusted transversely and vertically of the path of travel of the cartons to accommodate cartons of different widths and heights. Simultaneously with the transverse and vertical adjustment of the flap opening and closing means, the printing devices are adjusted transversely and vertically of the cartons, and these adjustments are made without interruptions or adjustments of the flexible driving means for the printing devices.

Although the invention has been described in connection with a single machine, it should be understood that the invention is not limited to the particular embodiment disclosed and that various changes, additions and omissions may be made without departing from the invention as defined by the appended claims. Thus the flap opening and closing means and the adhesive applying means of the machine may take various known forms other than that disclosed, and may, for example, be of the construction disclosed in Patent No. 1,815,571, dated July 21, 1931.

I claim:

1. In printing apparatus of the character described, in combination, a cylindrical rotating type surface and means for inking said type surface comprising a rotatable inking cylinder parallel to said type surface and engageable therewith during the rotation thereof, a block having an arcuate surface in engagement with the cylindrical surface of said inking cylinder, a shallow arcuate recess extending across the arcuate surface of said block, spaced inwardly from the axially spaced end edges of said arcuate surface and forming a shallow arcuate ink cavity between said block and the cylindrical surface of said inking cylinder, means for rotating said inking cylinder, the edge of said recess at which the cylindrical surface of said inking cylinder passes under said arcuate recess being tapered inwardly toward said recess and means for rotating said type surface at the same peripheral speed as the cylindrical surface of said inking cylinder.

2. In a printing apparatus of the character described, in combination, a cylindrical rotating type surface and means for inking said type surface comprising a rotary inking cylinder parallel to said type surface and engageable therewith during the rotation thereof, a stationary block having arcuate surfaced extensions adjacent the opposite ends thereof engaging and extending circumferentially about the cylindrical surface of said inking cylinder adjacent the respective ends thereof, said block having between said extensions an arcuate surface lying substantially parallel and closely adjacent to the cylindrical surface of said inking cylinder, said extensions and said arcuate surface forming an arcuate ink cavity between said block and said inking cylinder, and means for supplying ink to said recess.

3. In a printing apparatus of the character described, in combination, a cylindrical rotating type surface and means for inking said type surface comprising a rotary inking cylinder parallel to said type surface and engageable therewith during the rotation thereof, a stationary block having arcuate surfaced extensions adjacent the opposite ends thereof engaging and extending circumferentially about the cylindrical surface of said inking cylinder adjacent the respective ends thereof, said block having between said extensions an arcuate surface lying substantially parallel and closely adjacent to the cylindrical surface of said inking cylinder, said extensions and said arcuate surface forming an arcuate ink cavity between said block and said inking cylinder, means for supplying ink to said recess and means for moving a carton wall in tangential engagement with said rotating cylindrical type surface.

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