March 6, 1962 R. E. MILLER 3,023,698

MARKING APPARATUS

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Fig. 1

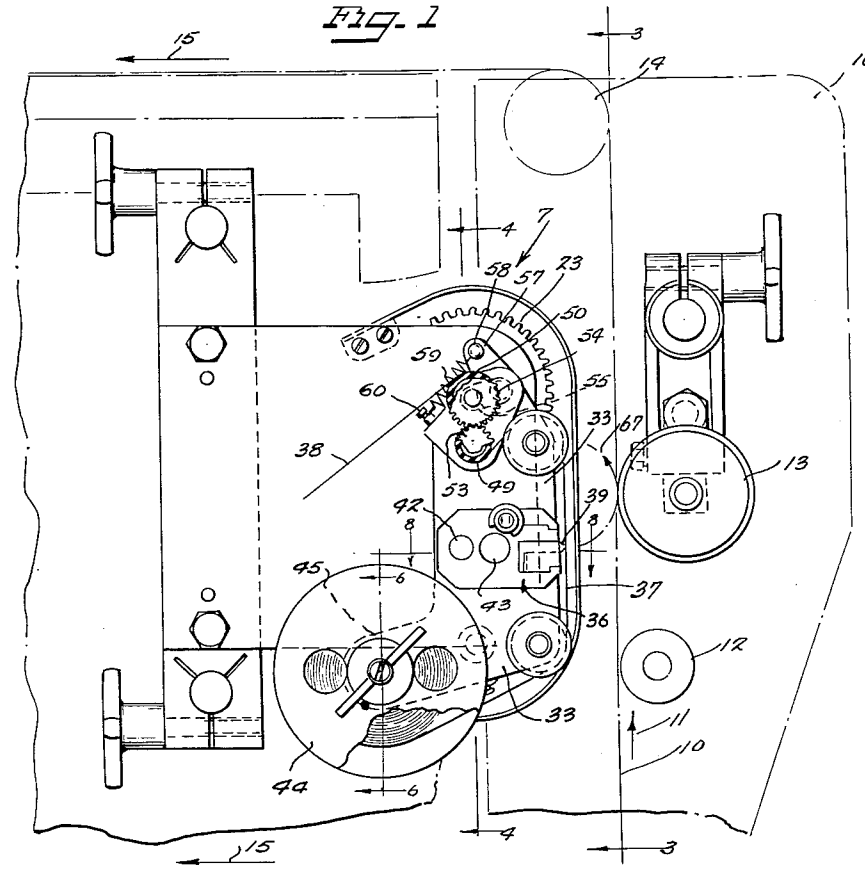
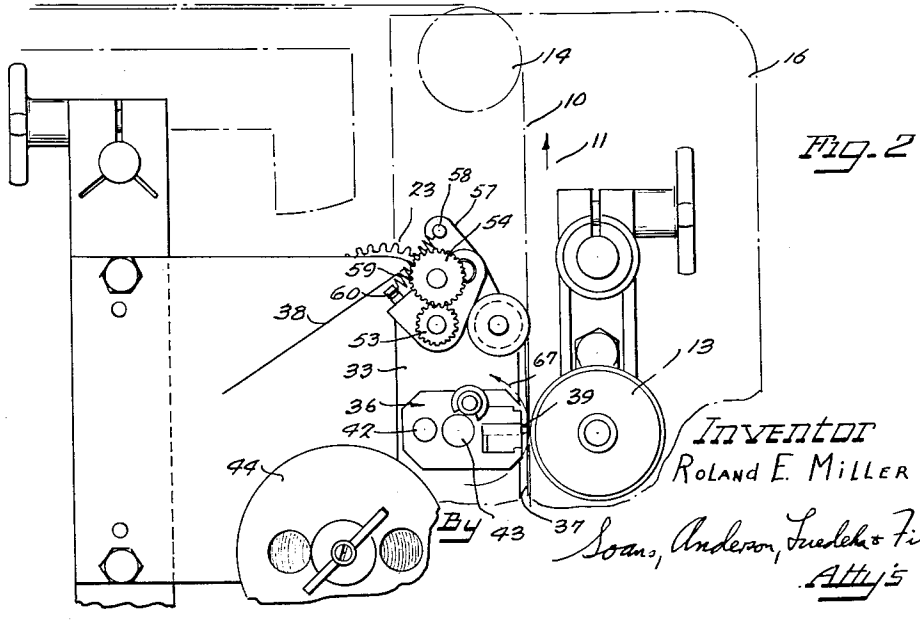


Fig. 2



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MARKING APPARATUS

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Fig. 3

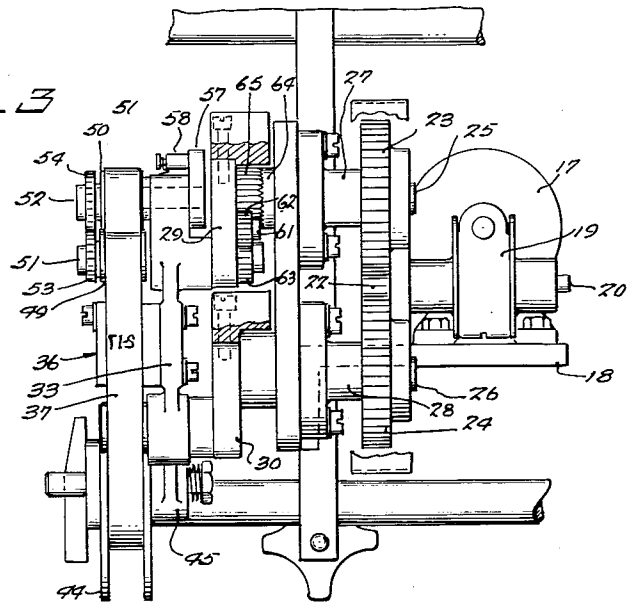
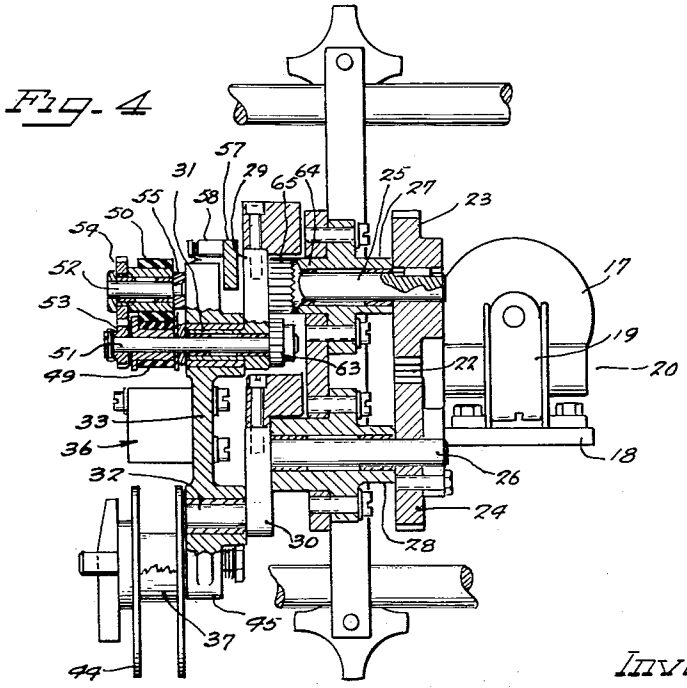


Fig. 4



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MARKING APPARATUS

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Fig. 5

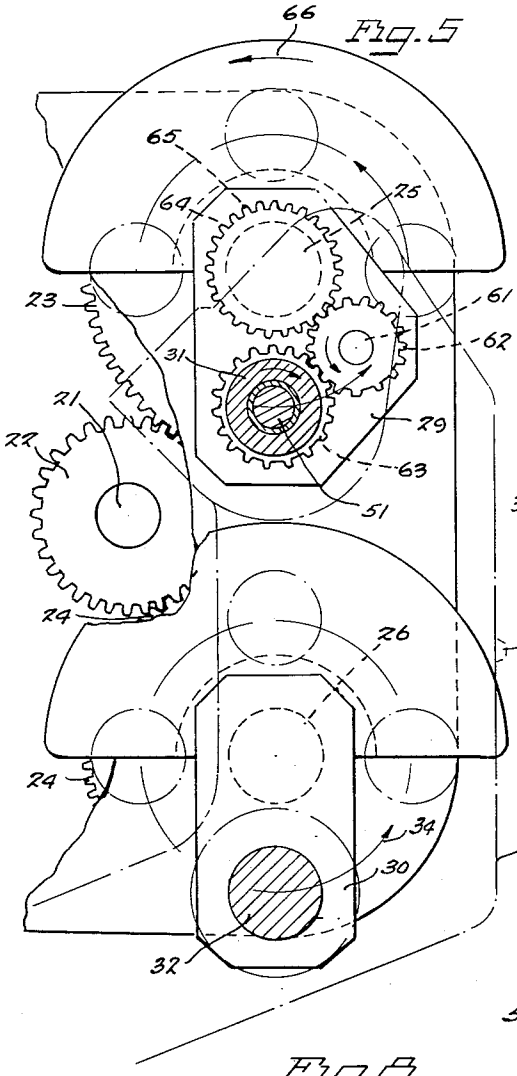


Fig. 6

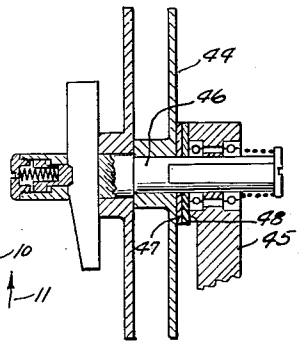


Fig. 7

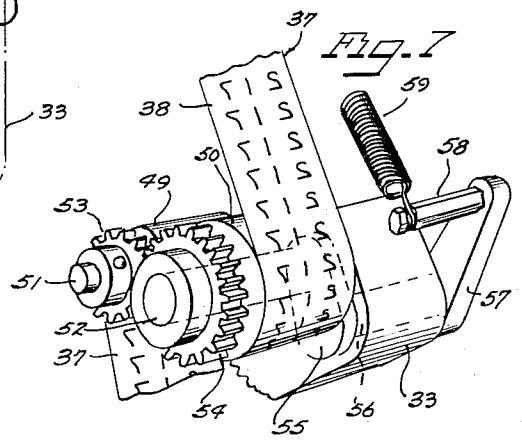
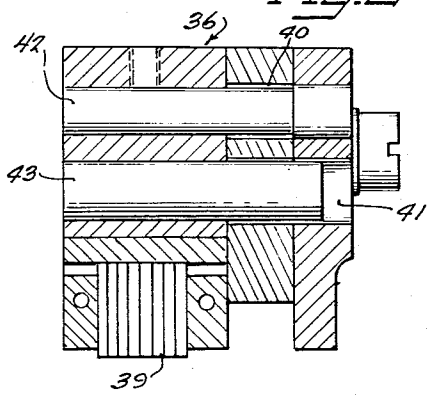


Fig. 8



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United States Patent Office 3,023,698 Patented Mar. 6, 1962

3,023,698

MARKING APPARATUS

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Filed Dec. 16, 1958, Ser. No. 780,743
8 Claims. (Cl. 101—291)

The invention relates to improvements in web marking mechanism and relates particularly to a machine or method for applying identifying data, such as a date or a code number, to a continuous moving web such as wrapping paper or similar material employed in the manufacture or wrapping of packages of merchandise so that the date of manufacture or other particulars involved in the making or packaging of a product may be applied thereto at the same time that the web of sheet material is being actually used during manufacture.

For example, in the manufacture of foods or other perishable products, or products which cannot be stored or displayed for sale for an indefinite period, it is an advantage in selling and distributing such products to have some means whereby the date of manufacture or some other information connected with the manufacture of the product can be determined, for example, the batch number or a code figure indicating the particular plant or machine involved in the manufacture of such product. Information of this character is of particular value to the distributor such as the wagon salesman who periodically visits a retail store where the merchandise is on sale so as to ascertain whether or not the store has on hand for sale any merchandise which, according to previous experience, should not be sold as a first quality product, if at all, because of the undue length of time since the date of manufacture.

Although other types of printing devices or methods may be capable of use in connection with the invention herein disclosed, the invention will be described as used in connection with the printing method disclosed in the United States application of Kenneth H. Brownlee, Serial No. 478,256, filed February 9, 1954, entitled "Marking Apparatus for Applying Printing Indicia to a Moving Web," which has been assigned to National Dairy Products Corporation, a Delaware corporation, which is the owner of the invention forming the subject matter of this application. Said Brownlee application issued on December 16, 1958, as United States Patent No. 2,864,309.

The method disclosed in said Brownlee application involves the use of a continuous tape having a heat releasable coating of marking material contrasting by color or otherwise with the web to be printed. In this particular method, the web of material is preferably supported upon a roll or platen of some kind and the tape is placed against the web and by pressing a heated printing member against the tape, the desired indicia is transferred from the tape to the web.

One of the principal objects of the present invention is to enable suitable indicia to be applied to a moving web, whether by the method above described, or otherwise, in such manner that the movement of the printing head or other device is so synchronized with the movement of the web which is being printed that the figures or characters printed upon the web are clean and distinct without smearing or overlap.

Other objects and advantages will appear as the description proceeds.

In the attached drawings which illustrate a specific application of my invention to a machine for wrapping or packaging food products:

FIGURE 1 is an elevation of the printer and associated parts, the printing head being shown in a retracted position;

FIGURE 2 is a similar view showing a portion of FIGURE 1, but showing the printing head in actual printing position;

FIGURE 3 is a section elevation taken on the line 3—3 of FIGURE 1;

FIGURE 4 is a section similar to FIGURE 3, but taken on the line 4—4 of FIGURE 1;

FIGURE 5 is an enlargement of a portion of FIGURE 1;

FIGURE 6 is a section taken on the line 6—6 of FIGURE 1;

FIGURE 7 is a perspective view of the ribbon feed shown in FIGURE 1, looking downward in the direction of the arrow 7; and

FIGURE 8 is a section taken on the line 8—8 of FIGURE 1.

Referring to the drawings, in FIGURE 1, the numeral 10 represents the continuous web of sheet material continuously moving in the direction of the arrow 11 upwardly in contact with a guide roll 12, an adjustable, preferably rubber covered, platen roll 13, and an upper guide roll 14, from which the printed web proceeds to the wrapping or packaging mechanism in the direction of the arrow 15. The rolls 12, 13 and 14 are mounted on a stationary structure or frame 16 which may be a portion of the frame of the wrapping machine. Said frame 16 also forms a stationary structure which supports various elements of the printing device.

Preferably, the platen roll 13 is driven by contact with the web 10, and is resiliently mounted to the frame 16 by any suitable means. The guide roll 14 is driven from the wrapping machine so that the web will move continuously through the printing zone at uniform speed to suit the requirements of the wrapping machine when the latter is in actual operation. Also, the printing machine itself is preferably driven from the wrapping machine so as to be synchronized with it.

In the event that it is desired to synchronize the printing mechanism with the wrapping mechanism in such manner that the indicia will appear on the wrapper at approximately the same location on each completed package, the printing mechanism should be geared to and driven by the wrapping machine. However, if it is immaterial where the indicia appear on the finished package so long as they appear on any visible part of the wrapper, the printing machine may be driven by an independent motor, as shown in the present disclosure. To this end, an electric motor 17, as best shown in FIGURES 3 and 4, is mounted on a bracket 18 forming a part of the stationary frame 16. The motor is equipped with a suitable gear reducing mechanism 19, such as a worm gear arrangement, for driving the printing mechanism in proper synchronization with the continuously moving web 10, as will hereinafter appear.

The low speed power take-off shaft 20 is directly connected by means of a coupling (not shown) to the main shaft 21 on which is keyed a spur gear 22. Said spur gear 22 meshes with an upper spur gear 23 and a lower spur gear 24 which are keyed to the ends of the shafts 25 and 26 respectively, rotating in bearings 27 and 28. The spur gears 23 and 24 are of the same diameter and pitch so that the motor 17 serves to drive them at the same speed and in the same direction.

On the opposite sides of the bearings 27 and 28, the shafts 25 and 26 are equipped with crank arms 29 and 30 respectively, as best shown in FIGURE 5, and the pins 31 and 32 on the ends of said crank arms are journalled in a floating carrier 33. The crank arms 29 and 30 are the same length and are oriented in the same man-

ner, as shown best in FIGURE 5, and since they have the same throw and are geared together to run at the same speed, their rotation serves to impart to the carrier 33 a circular gyratory movement. Hence, each point on the carrier will describe a circle of the same radius as the throw of the cranks and in a circular path exactly parallel with and similar to the path described by each of said crank pins 31 and 32.

The speed of the motor 17 and the gear ratios employed are adjusted so that the peripheral speed on the center of each crank pin and also each point on the floating carrier 33 will be the same as the linear speed of the continuously moving web 10. Said peripheral speed of each such point on the carrier will be in the same direction, i.e. vertical and in an upward direction when the crank pins have moved in a counter-clockwise direction (as shown by the arrow 34) to their extreme right hand position as shown in FIGURE 2. Hence, at that particular point in the rotary movement of the floating carrier 33, every point on the carrier 33 will be moving upwardly in its extreme right hand position (see FIGURE 5) and at the same speed as the traveling web 10.

Said floating carrier 33 serves as a movable support for the printer designated as a whole as 36, and for the mechanism which feeds marking tape 37 between the printing head and the web. In this connection, it will be understood that the feeding mechanism serves to feed the marking tape upwardly a distance just enough to accommodate a single impression made by the type of the printing head, normally about ¼ inch.

The used ribbon or tape 38, as indicated in FIGURE 7, may be delivered to a take-up (not shown), preferably but not necessarily mounted on the floating carrier 33.

The printing head or type-holder 36, shown in section in FIGURE 8, in the present instance is of the relief printing type having a row of type units 39 sufficient in number to provide such indicia as may be required to impart the desired dating or other information. Any conventional method of holding these type in such manner that they can, at any time, be quickly rearranged in the proper order, may be employed. In the type-holder or printing head 36, there are preferably provided pockets such as 40 and 41 for receiving electrical heating units 42 and 43 of a conventional character.

The supply reel or spool 44 for holding the unused tape is preferably organized so that when the tape is pulled off the supply spool by the feed mechanism, a slight frictional drag will be imparted to the tape. This is accomplished as follows: As shown best in FIGURE 6, the spool 44 is mounted to rotate on a stud 46, coil springs being preferably used to exert the required amount of pressure between the clutch plates 47 and 48 which are imposed between the spool 44 and the arm 45.

The slow feeding movement of the tape is actually effected by a pair of coacting rollers 49 and 50 (preferably rubber-faced), mounted on shafts 51 and 52, the outer ends of which are fitted with mating spur gears 53 and 54. As shown best in FIGURE 7, the upper shaft 52 constitutes the pin on the outer end of a crank arm element 55, the shaft of which is journalled in a part of the carrier 33. The other end of said shaft 56 is equipped with an arm 57 having at its outer end a stud 58 to which a tension spring 59 is connected. The other end of said tension spring 59 is connected to a stud 60 (see FIGURE 1) so that the shaft 52 is always pressed resiliently towards the shaft 51. In this way, the tape is pinched between the rollers 49 and 50, and when the shaft 51 is rotated in the carrier, the tape will be advanced and pulled upwardly past the printing head 36 and off the supply spool 44. Preferably, there is sufficient play between the intermeshing teeth of the gears 54 and 53 so that the rubber rollers 49 and 50 will have proper contact to drive the tape. The ratio between the diameters of the feed rolls 49 and 50 is substantially the same as the ratio between the pitch diameters of the spur gears 53 and 54, slippage between the rolls being thereby avoided.

The means for positively rotating the primary tape-feed shaft 51, which, as shown, is in fact an integral extension of the crank pin 31 previously described (see FIGURE 5), will now be described.

Upon an examination of FIGURES 5 and 3, it will be seen that the upper part of the carrier is provided with a stub shaft 61 fixed in the carrier and constituting a journal on which rotates an intermediate gear 62 which meshes with a planetary gear 63 fixed on the rear or right hand end of the rotary crank pin 31. Whatever rotary movement is imparted to the gear 62 will be transmitted to the gear 63 causing it to effect rotation of the crank pin 51 (and shaft 31) in the reverse direction.

Still referring to FIGURES 5, 3 and 4, it will be observed that the frame portion 16 on its left hand or forwardly presented side has a fixed boss or stud-like formation 64 on the outside of which are formed spur gear teeth 65 concentric with the shaft 25 and meshing with the teeth of the intermediate gear 62. By means of the planetary gear arrangement just described, a differential rotary movement of the shaft 51 in the carrier may be effected, the direction and rate of rotation being controlled by the predetermined ratio of the pitch diameters of the gears 65 and 63. It will be understood that the gear 62 is merely an intermediate gear which reverses the rotation of the gear 63.

Because the crank arm 29 on the axially fixed shaft 25 causes the pin 31 to make a complete revolution around the axis of the shaft 25 as an incident to each revolution of said shaft 25 around its own axis, said pin 31, if fixed in the crank arm 29, would rotate one revolution in the same direction as the shaft 25, i.e. counter-clockwise, as shown by the arrow 66 in FIGURE 5. However, the pin 51 serves as the axle or shaft for turning the primary feed roll gear 63, which must be rotated in the other direction, i.e. clockwise in the carrier, and at such a rate as to advance the tape or ribbon about ¼ inch for each revolution of the main shaft 25. Therefore, it is necessary to reverse the direction of the normal anti-clockwise rotation of the crank pin 51 relative to the carrier. Also, said pin 51 must have a sufficient additional movement in the clockwise direction to effect the necessary movement of the tape, in order to present a fresh surface upon which the type may operate at the next printing operation for each succeeding revolution of the main shaft 25. This reversal of the rotary movement of the crank pin is effected by the differential planetary gear arrangement.

The roll 49, which is the power driven measuring roll contacting with the idler roll 50, may have a diameter of about ½ inch with a circumference of somewhat more than 1½ inch so that the measuring roll shaft 51 will require to be advanced in a clockwise direction about ⅙ of a revolution in the carrier 33 in order to give a longitudinal tape movement of about ¼ inch for each cycle of the printing mechanism. This means that the number of teeth in the gear 65 in that case should be about ⅙ more than in the planetary gear 63 on the shaft 51. Hence, if the pitch diameter of the gear 65 is 1 inch, the diameter of the gear 63 should be about ⅚ of an inch.

In view of the above description, the operation of the machine is obvious. Each printing operation or cycle involves one complete revolution of each of the main shafts 25 and 26 which are geared together by the intermediate driving gear 22 engaging gears 23 and 24 on said main shafts. By means of the crank arrangements 29 and 30 previously described, the carrier 33 on which the printing head is mounted will be gyrated or rotated so that during each revolution of the main shaft 25, the type face 39 while maintaining its oriented position as part of the floating carrier will move in a circular path 67 in the direction of the arrow 68 (see FIGURE 5).

When the type face **39** reaches the osculating position shown in FIGURES 5 and 2, the spacing between the platen roll **13** and the type face **39** will be such that the heated type will press the tape against the web, which at that time is pinched between the platen roll **13** and the type.

Since the tape advances only about ¼ inch during the revolution, there will be plenty of time for the heated type to fuse the plastic coating on the right hand face of the ribbon and transfer a part of the heated material to the surface of the web. At that time, the upward movement of the web **10** and the upward movement of the type face **39** on the carrier **33** is substantially synchronized, so that there is no smearing and no rubbing action between the traveling web and the ribbon. Hence, an extremely clean and distinct impression will be made. The advancing movement of the tape to the extent of about ¼ inch per revolution, as an incident to the feeding of the tape may be instantaneously stopped during the extremely small portion of the revolution or cycle that the type is actually printing the web, but, however, the inherent stretch in the ribbon will allow for this.

Various of the features of the invention believed to be novel are set forth in the appended claims.

I claim:

1. Web-marking mechanism comprising in combination, a printer, a platen for supporting a forwardly moving web which is interposed between said platen and said printer, a carrier for said printer and for a ribbon which is interposed between said moving web and said printer, and is adapted to mark said web under the influence of said printer, means for bodily rotating said carrier around an axis which is substantially parallel to the plane of the web, and in a path lying in a plane which is substantially perpendicular to the plane of the web so as to pinch the ribbon between said platen and said printer, and to thereby print a mark on said web, while moving said ribbon in a forward direction in substantial synchronism with said web, and means for effecting a limited lengthwise movement of said ribbon on said carrier in timed relation to the operation of said carrier rotating means.

2. Web-marking mechanism comprising in combination, a printer which includes a marking ribbon, a platen for supporting a forwardly moving web which is interposed between said printer and said platen, a carrier on which said printer is mounted so as to interpose said ribbon between said moving web and said printer, means for bodily moving said carrier and said printer in a substantially circular path so as to move the printer towards the platen in a plane perpendicular to said web so as to pinch the ribbon between said platen and said printer and to thereby print a mark on said web, while moving said ribbon in a forward direction at the same speed as the speed of said web during the printing operation, and automatic means for effecting a limited lengthwise movement of said ribbon relative to said carrier as an incident to the movement of said carrier.

3. Web-marking mechanism comprising in combination, a printer, a platen for supporting a forwardly moving web which is interposed between said printer and said platen, a carrier for supporting said printer and a ribbon which is interposed between said moving web and said printer, means for actuating said carrier to move the printer towards the platen so as to pinch the ribbon between said platen and said printing element and to thereby print a mark on said web, while moving said ribbon in a forward direction in substantial synchronism with said web including a shaft, a crank on said shaft and having its outer end pivoted to said carrier, means for continuously rotating said shaft and means cooperating with said crank for imparting to said carrier a closed-path circular bodily movement, thereby printing a mark on said web while moving said carrier forwardly in substantial synchronism with said web, and automatic means for effecting a limited lengthwise movement of said ribbon relative to said carrier as an incident to the movement of said carrier.

4. Web-marking mechanism comprising in combination a printer, a platen for supporting a forwardly moving web which is interposed between said printer and said platen, a carrier for supporting said printer and a ribbon which is interposed between said moving web and said printer, and which is adapted to mark said web under the influence of said printer, means for actuating said carrier to move the printer towards the platen so as to pince the ribbon between said platen and said printing element and to thereby print a mark on said web, while moving said ribbon in a forward direction in substantial synchronism with said web, said synchronizing means including a pair of spaced shafts, a pair of cranks on said shafts and having their outer ends pivoted to said carrier, and means for continuously rotating said shafts so as to impart to said carrier and printer a closed-path circular bodily movement, thereby printing a mark on said web while moving said carrier forwardly in substantial synchronism with said web, and automatic means for effecting a limited lengthwise movement of said ribbon relative to said carrier as an incident to the movement of said carrier.

5. Web-marking methism comprising in combination a printer, a platen for supporting a forwardly moving web which is interposed between said printer and said platen, a carrier for supporting said printer and a ribbon which is interposed between said moving web and said printer, and which is adapted to mark said web under the influence of said printer, means for actuating said carrier to move the printer towards the platen so as to pinch the ribbon between said platen and said printing element and to thereby print a mark on said web, while moving said ribbon in a forward direction in substantial synchronism with said web, said synchronizing means including a shaft, a crank on said shaft and having its outer end pivoted to said carrier, means for continuously rotating said shaft, and means cooperating with said shaft for imparting to said carrier a closed-path circular bodily movement thereby printing a mark on said web while moving said carrier forwardly in substantial synchronism with said web, and automatic means for effecting a limited lengthwise movement of said ribbon relative to said carrier as an incident to the movement of said carrier, including differential planetary gearing on the carrier which is operated by the movement of the carrier around the axis of said shaft.

6. A web-marking mechanism comprising in combination a frame, a gyratory floating carrier on said frame, a printer mounted on said carrier and positioned on said carrier so as to effectively engage and mark a continuous web which moves continuously and in the same direction and at the same speed as the printer when the web is engaged by the printer, a platen for supporting the web when it is engaged by the printer, and means for rotating said carrier bodily so as to move said printer continuously in a closed orbit along side, and tangential to, the path of movement of the web, said rotating means including an arm having one end pivoted on said frame and another end pivoted on said carrier, and means for rotating said arm around the frame pivot point.

7. A web marking mechanism comprising in combination a frame, a gyratory floating carrier on said frame, a printer mounted on said carrier and positioned on said carrier so as to effectively engage and mark a continuous web which moves continuously and in the same direction and at the same speed as the printer when the web is engaged by the printer, a platen for supporting the web when it is engaged by the printer, and means for rotating said carrier bodily so as to move said printer continuously in a closed orbit along side, and tangential to, the path of movement of the web, said rotating means including a pair of parallel, spaced arms each having one end pivoted on said frame and another end pivoted on said carrier, and means for rotating said arms around the frame pivot points.

8. Means for marking a sheet moving in one direction, comprising, in combination, a platen on one side of the sheet for supporting the latter, a printer on the other side of the sheet, a carrier for said printer, means for continuously rotating said carrier as a whole in a plane which is perpendicular to the plane of the sheet and is parallel to the direction of movement of the sheet, and means for preventing change in the orientation of said carrier in said plane during its rotation so that all points on said carrier spaced in said plane of rotation will rotate respectively around separate axes spaced in said plane of rotation, but in like orbits in said plane, the position of said printer on said carrier being such that the printer at one point

in its orbit will make tangential contact with the sheet supported by said platen, said carrier rotation being in such direction and at such speed that said printer and sheet will be moving at the same speed and in the same direction when said contact is made.

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