Jan. 14, 1958 H. PORTER, JR., ET AL 2,819,671

ELECTRICALLY CONTROLLED APPARATUS FOR PRINTING ON MOVING ARTICLES

Filed May 18, 1956 3 Sheets-Sheet 1

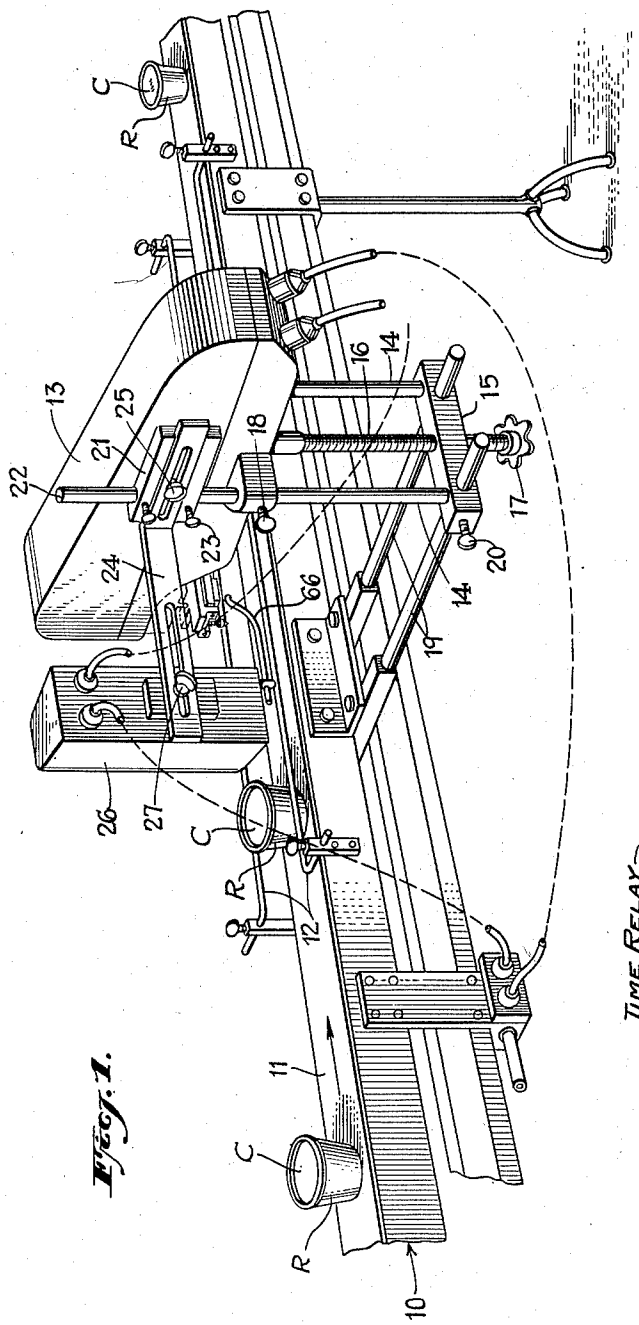


Fig. 1.

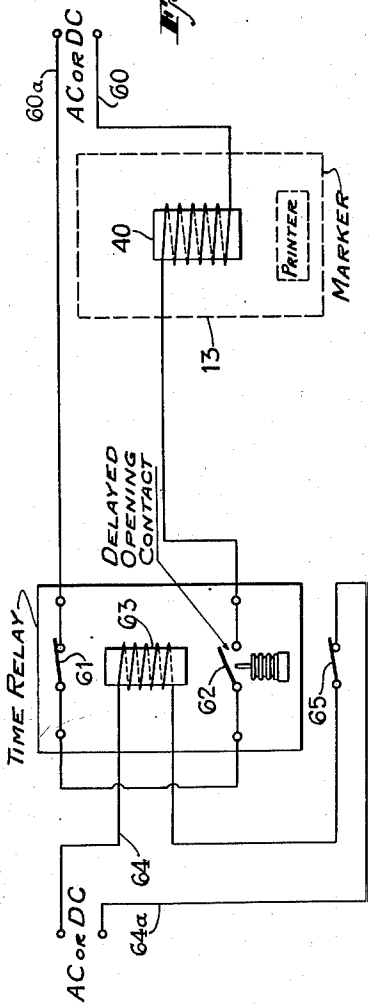


Fig. 7.

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Fig. 2.

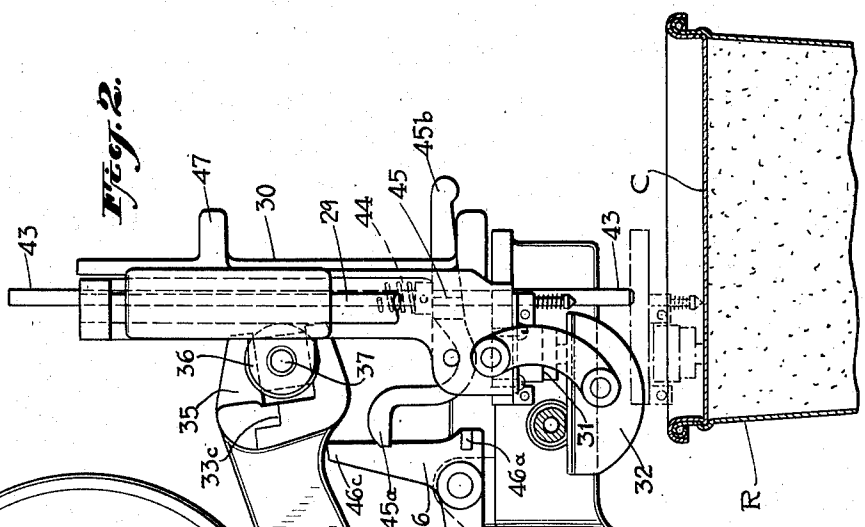


Fig. 4.

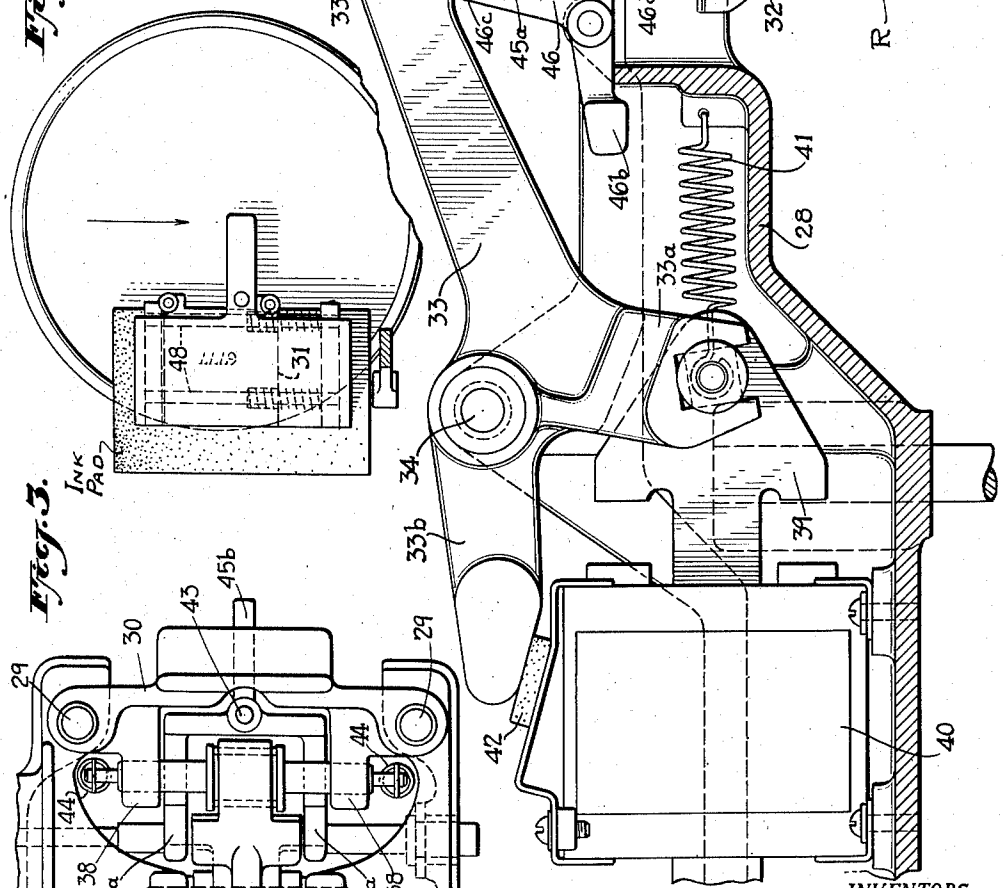


Fig. 3.

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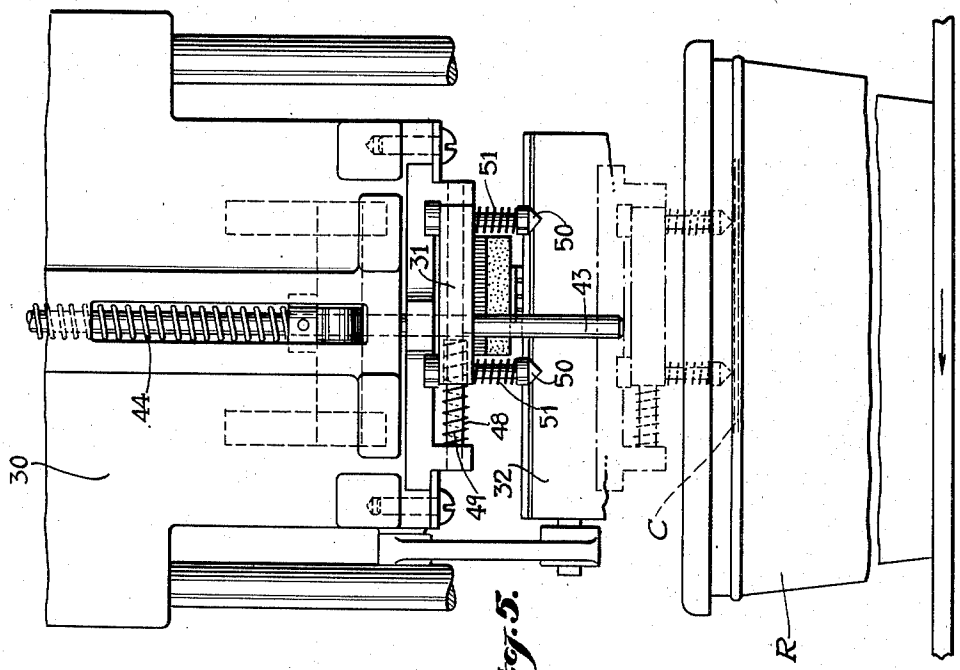


Fig. 5.

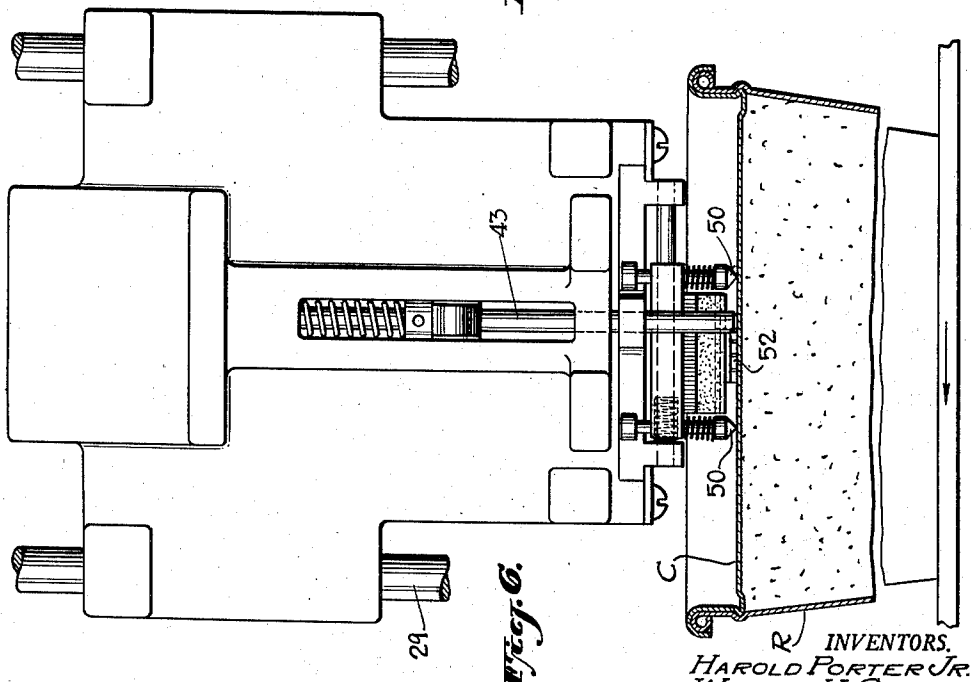


Fig. 6.

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ELECTRICALLY CONTROLLED APPARATUS FOR PRINTING ON MOVING ARTICLES

Harold Porter, Jr., Armonk, and William H. Glunz, Flushing, N. Y., assignors to Lily-Tulip Cup Corporation, New York, N. Y., a corporation of Delaware

Application May 18, 1956, Serial No. 585,701

6 Claims. (Cl. 101—44)

This invention relates to apparatus for marking code numbers or other desirable indicia on successive articles of a series of moving articles, and more especially to electrically controlled apparatus for printing on articles while in motion.

The invention is particularly useful in marking on the recessed closure lids of filled receptacles made of paper or other yieldable material and is readily adapted for use at the output end of a filling and capping machine where such filled receptacles are being fed in a linear series.

Heretofore it has been customary in printing upon recessed lids to interrupt the feed movement of individual receptacles at the printing zone and retain the same at rest during the marking interval. This was usually done by intercepting a given receptacle with a positive stop and permitting the conveyor belt to slip beneath it while carrying succeeding receptacles forward. The result is that succeeding receptacles bunch-up behind the one being marked. This not only required additional stop means to keep the succeeding articles from interfering with the ones at rest but caused substantially increased power loss due to the continued movement of the belt beneath a plurality of containers held at rest. Another method was to intermittently stop the feed, but this was even less desirable.

Additionally, in either procedure the intermittent stopping of the receptacle during the time of printing causes a "bottleneck" in the production line, and therefore slows up the rate of filling and capping. Although proposals have been made to print on articles while moving, no apparatus has heretofore been devised which would meet the requirements of printing on moving receptacles of the character described in a satisfactory manner under automatic control of the moving receptacle.

An object of the invention is to provide apparatus which overcomes the above-mentioned difficulties and accomplishes the desired results in an expeditious manner.

Another object is to provide apparatus which prints clearly and sharply on the lids of filled receptacles while the same are continuously moving and according to cyclical control operated by the movement of the article to be printed.

Further objects, features and advantages of the invention will more fully appear from the following description, taken in connection with the accompanying drawings in which:

Fig. 1 is a perspective view showing an embodiment of the invention;

Fig. 2 is a side elevational view of the printing unit shown in Fig. 1, with the cover removed and certain parts broken away to show the interior mechanism;

Fig. 3 is a partial top plan view showing the reciprocating head forming a part of the unit shown in Fig. 2;

Fig. 4 is a top view showing a type holder, type and ink pad forming a part of the mechanism shown in Fig. 3;

Figs. 5 and 6 are front elevational views of certain features shown in Figs. 2, 3 and 4, showing the parts in two different positions of operation and;

Fig. 7 is an electric circuit diagram showing the electrical means of the cyclical control of the apparatus shown in Fig. 1.

Referring more particularly to Fig. 1, supporting frame for the apparatus is designated in general as **10** and may conveniently form a part of a machine in conjunction with which the present invention is adapted to be used, such for example as a machine for filling and capping containers which are to be marked with a suitable code number or other indicia. Conveyor means comprising a conveyor belt **11** and guide rods such as **12** serve to feed articles to be printed. In the present embodiment these articles are receptacles designated R having closure covers designated C and the receptacles are adapted to be linearly fed in a series in what will be termed a longitudinal direction as indicated by the arrow. A marking or printing unit designated in general as **13** is positioned at what will be termed the printing station for printing upon the covers of successive receptacles during the continuous movement of said receptacles past the printing station.

The printing unit **13** is slidably mounted on guide rods such as **14** and extending upwardly from a cross bar **15** in which is threadingly engaged a jack-screw **16** whose upper end engages the frame of the printing unit **13** which may be adjusted to the proper vertical position by rotation of the hand wheel **17** and may be locked in adjusted position, commensurate with the height of the article to be printed, by thumb screws such as **18**. The cross bar **15** is slidably disposed on horizontal guide rods **19** permitting adjustable movement of the printing unit in a direction transverse the path of movement of the receptacles, and the unit **13** may be secured in the desired adjusted position by means of thumb screws such as **20**.

A clamp block **21** is mounted for vertical adjustment on the upper end **22** of one of the guide rods **14** and may be adjustably secured thereon by means of thumb screws such as **23**. A supportnig angle arm **24** has one leg secured to the block **21** by means of a thumb screw **25** passing through a horizontal slot in the arm **24** to provide for adjustment of said arm in a direction transverse to the said path of movement; and the other leg of the arm **24** serves to support an electrical switch control box designated in general as **26** adjustably secured to the arm **24** by means of a thumb screw **27** passing through a slot in the arm **24** to provide for adjustment of said box in a longitudinal direction.

Printing unit

The printing unit **13** will now be described with reference more particularly to Figs. 2 and 3. The printing unit frame is designated as **28** and is provided with a pair of vertical guide rods **29** on which is supported for vertical movement a reciprocable head in the form of a slide block **30** which carries on its lower end a type holder assembly designated in general as **31**. In the present embodiment the type is adapted to print the desired code marking in ink supplied by an ink pad assembly designated in general as **32**. The reciprocating printing head **30** is moved downwardly on its printing stroke by means of a lever **33** pivotally supported as at **34**. The forward end of the lever **33** is provided with a yoke **35** in which is slidably engaged a block **36** rotatably mounted on a pivot **37** which is secured to the head **30** by means of rearwardly extending lugs (Fig. 3) such as **38**. The lever **33** is provided with an arm **33a** which extends downwardly below the pivot **34** and is operatively con-

nected to the forward end of an armature 39 by means of a slide block and pivot arrangement similar to 36 and 37 above described. The armature 39 passes rearwardly through a cooperating electric solenoid 40 which serves when energized to rotate the lever 33 in a clockwise direction on the stamping or printing stroke, and the parts are moved on the return stroke by a helical tension spring 41. The travel of the lever on the return stroke, in an anti-clockwise direction is limited by a rearwardly extending arm 33*b*, engaging a resilient pad 42 mounted on the solenoid 40.

Suitable locking mechanism is provided to prevent the downward movement of the type head 31 when no article is in position to be marked. A rod 43 is slidably mounted in the reciprocating head 30 and is urged downwardly by helical compression springs 44. The lower end of the rod 43 acts as a feeler finger. The rod carries secured thereto a tripper 45 provided with a rearwardly extending yoke having arms 45*a* disposed above and in register with forwardly extending arms 46*a* provided on a latch 46 which is normally urged in an anti-clockwise direction by a weighted arm 46*b* and which is provided with upwardly extending latch arms 46*c* adapted to engage a stop 33*c* on the forward end of the lever 33. Accordingly, if the head 30 moves downwardly and the lower end of the rod 43 engages against a closure cap C of the container R, as in Fig. 6, the rod 43 moves upwardly relative to the head 30 thereby positioning the tripper arms 45*a* in inactive position so that the lever 33 can continue its movement on the printing stroke. However, if no receptacle is in position, the lower end of rod 43 will continue to move down to a position below that shown in Fig. 6 and at that point the tripper arms 45*a* will engage the latch arms 46*a* to rotate the latch 46 in a clockwise direction so that the arms 46*c* will engage the stop 33*c* and thus prevent the printing head from moving to its printing position. The arm 45 is also provided with a forwardly extending position 45*b* which is disposed in vertical alignment with a finger piece 47 formed on the sliding head 30. By engaging the position 45*b* with one finger of the extension 47 with the other, the arm 45 may be moved upwardly to compress the springs 44, thus permitting the type holder assembly 31 to be readily removed, said assembly 31 being held in seated position by the trip arm 45.

Type holder

The type holder 31 will be more particularly referred to with reference to Figs. 4, 5 and 6. The type holder 31 is slidably mounted on a pair of parallel guide rods 48 (Fig. 4) which extend in a direction parallel to the longitudinal path of travel of the articles to be printed, as designated by the arrows in Figs. 4, 5 and 6, serving to provide movement of the type holder in a direction of the path of travel of said articles relative to the reciprocating axis of the head 30 while at the same time moving said type directly with the head 30. The head 31 is resiliently urged in a direction opposite to the movement of the articles to be printed, to the position shown in Fig. 5, by means of helical compression springs such as 49. The printing head 31 is provided with register pins such as 50 held in limited extended position by helical compression springs such as 51 so as to hold the lower pointed ends of the pins 50 below the printing face of type 52 carried on the head 51 (Fig. 5) while permitting the pins to be moved upwardly to substantially the printing face of the type 52 when in engagement with the article to be printed (Fig. 6). The particular sliding type holder above described is not claimed per se herein since it forms the subject matter of the co-pending application of William H. Glunz, filed on May 18, 1956, Serial No. 585,872 where this unit is more particularly described and claimed.

Electrical circuit

The cyclical electrical control means for the printing unit 13 will now be described with particular reference to Fig. 7 from which it will be seen that electrical solenoid 40 for actuating the reciprocating head 30 is supplied by electrical circuit designated as 60—60*a*. This supply circuit is controlled by electrically actuated time delay switching means comprising a first switch 61 and a second switch 62 which is provided with delayed opening contacts and these switches are actuated by a solenoid 63 provided with an electrical supply circuit 64—64*a*. The supply circuit 64—64*a* is provided with a control switch 65. The control switch 65 is movable to open and closed positions by an arm 66 (Fig. 1) whose outer end is curved and is disposed in the path of movement of the articles to be printed upon, such as the receptacles R, and is positioned in advance of the printing station. The control switch arm 66 may be positioned in the desired location by vertical, longitudinal, and lateral adjustment of the switch control box 26 by the means previously described.

The switching means is adjusted to operate in the following manner. As a receptacle R moves into engagement with the arm 66 the switch 65, which is initially closed, is opened to thereby de-energize the solenoid 63, whereupon its armature moves to de-energized position to thereby open switch 61 and close the time relay switch 62. As the moving receptacle R passes out of engagement with the arm 66, the switch 65 is closed, thereby energizing the solenoid 63 which closes switch 61 and thereby completes the energizing circuit for the relay 40. This in turn moves the printing head 30 downwardly carrying the pointed ends of the pins 50 (Fig. 5) into registering contact with the upper face of the cover C of a receptacle R and the slight indentation of the pins into the cover serves to hold the type in register and causes the type to be moved with the receptacle during the printing engagement of the type with the face of the cover (Fig. 6). Just before the type holder has moved to the limit of its sliding movement the time relay switch 62 is opened by its pneumatic control means, and the energizing circuit to solenoid 40 (Fig. 7) is broken, releasing the printing head 30 which is then moved upwardly on its return stroke by the helical spring 41 (Fig. 2) thus restoring the parts for the second cycle of operations. In the above described electrical circuit we have obtained entirely satisfactory results by using for switches 61 and 62 time delay relay unit No. 849–AX, manufactured by Allen-Bradley Co., Milwaukee, Wisconsin, which permits suitable adjustment of the time delay to the desired interval of printing time adapted for the speed of conveyor feed of the articles to be printed upon. For the control switch 65 we have used with entire satisfaction "Acro" switch TD–48L operated by a spring biased arm serving to urge the switch to closed position.

Operation

Referring more particularly to Figs. 1 and 7: As the series of receptacles R are fed forward by the conveyor belt 11 between the guide rails 12, succeeding receptacles pass in front of the control box 26 and into engagement with the switch arm 66, which is yieldably held in the path of movement by a spring. As a moving receptacle moves the arm 66 outwardly the switch 65 (Fig. 7) is moved to open position thereby de-energizing the solenoid 63 which opens the quick operating switch 61 and closes the time relay switch 62 in series therewith. As a receptacle passes beyond the end of the arm 66 the arm moves inwardly to its initial position to thereby close the contact 65 which energizes a relay 63 to thereby close contact 61 and complete the circuit to energize the printing head relay 40; the circuit being closed through the time delay switch 62. The energization of the relay 40 (Fig. 2) rotates the arm 33 in a clockwise direction, causing the printing head 30 to move downwardly on its printing stroke. The feeler finger 43 engages the closure C, permitting the printing head to continue its down

stroke. Shortly before the type **52** (Fig. 5) comes into printing engagement with the cover C the register pins **50** engage the cover and this serves to carry the type holder **31** in the direction of movement of the receptacle R and at the same speed of travel, at which time the type has been brought into printing engagement with the surface to be printed. The time delay switch **62** is so adjusted that it remains closed during this travel of the type in printing engagement with the cover C and opens just before the type holder **31** reaches the end of its sliding stroke. Upon the opening of the time relay switch **62** the solenoid **40** is deenergized and the printing head is returned to its upper position by the tension spring **41** (Fig. 2) and the cycle of operation is concluded and the parts are in position to repeat the sequence as successive containers are fed to the printing station.

From the foregoing, it will be understood that the total time during which the time relay **62** is closed covers the interval between the opening of switch **61** and the time required for the printing head to move the type into printing engagement and the movement of the type with the article being printed.

Having thus described our invention with particularity with reference to the preferred apparatus, it will be obvious to those skilled in the art, after understanding our invention, that changes and modifications may be made without departing from the spirit and scope of our invention, and we aim in the appended claims to cover such changes and modifications as are within the scope of the invention.

What we claim is:

1. In apparatus of the character described, the combination of a reciprocable printing head, a type holder secured to said head supporting type movable with said head into printing engagement with an article to be printed and movable with respect to said head in a direction transverse to a direction of reciprocation for limited travel with an article to be printed upon, electrical actuating means for reciprocating said head, an electrical supply circuit for said actuating means, electrically actuated time delay switching means in said circuit, a supply circuit for said switching means, and a control switch for said switching supply circuit responsive to the movement of an article into the printing zone, said time delay switching means providing a time delay switch to maintain said actuating means energized for a time interval substantially equal to the sum of the time of the printing stroke of the reciprocating head and the time of moving of said type in a direction transverse to the direction of reciprocation.

2. In apparatus of the character described, the combination of a reciprocable printing head, a type holder secured to said head supporting type movable with said head into printing engagement with an article to be printed and movable with respect to said head in a direction transverse to a direction of reciprocation for limited travel with an article to be printed upon, electrical actuating means for reciprocating said head, an electrical supply circuit for said actuating means, electrically actuated time delay switch means in said circuit, a supply circuit for said switching means, and a control switch for said switching supply circuit, said control switch having an actuating member disposed in the path of travel of an article to be printed upon and being positioned in advance of the printing zone, said time delay switching means providing a time delay switch to maintain said actuating means energized for a time interval equal to the sum of the time of the printing stroke of the reciprocating head and the time of moving of said type in a direction transverse to the direction of reciprocation.

3. In apparatus of the character described, a combination of a reciprocable printing head, a type holder secured to said head supporting type movable with said head into printing engagement with an article to be printed and movable with respect to said head in a direction transverse to a direction of reciprocation for limited travel with an article to be printed upon, electrical actuating means for reciprocating said head, an electrical supply circuit for said actuating means, switching means in said actuating circuit, said switching means comprising an initially closed quick operating switch and an initially open delayed opening switch in series in said actuating circuit and a solenoid for operating said quick operating switch and delayed opening switch in such sequence as simultaneously to open said quick operating switch and close said time delayed switch and thereafter to close said quick opening switch while the opening of said time delayed switch is delayed, a supply circuit for operating said solenoid, a control switch for said solenoid supply circuit, said control switch having an actuating arm disposed in the path of travel of an article to be printed upon and being positioned in advance of the printing zone, said delayed opening contact switch providing a time delay equal to the sum of the time interval between the opening and closing of said quick operating switch and the time of the printing stroke of the reciprocating head and the time of moving of said type in a direction transverse to the direction of reciprocation.

4. In apparatus of the character described, the combination of conveyor means for moving a series of articles in a longitudinal path of travel past a printing station, a reciprocable head disposed at said station, a type holder secured to said head supporting type for movement with said head into printing engagement with a moving article and slidable in a direction parallel to said path of movement with an article during said printing engagement, electrical actuating means for reciprocating said head, an electrical supply circuit for said actuating means, control means for said supply circuit operable by movement of an article into printing position to energize said actuating means and time delay means for de-energizing said actuating means after said printing type has moved into printing engagement with an article and has moved with an article in a direction parallel to said path of movement.

5. In apparatus of the character described, the combination of conveyor means for moving a series of articles in a longitudinal path of travel past a printing station, a reciprocable head disposed at said station, a type holder secured to said head supporting type for movement with said head into printing engagement with a moving article and slidable in a direction parallel to said path of movement with an article during said printing engagement, electrical actuating means for reciprocating said head, an electrical supply circuit for said actuating means, electrically actuated time delay switching means in said circuit, a supply circuit for said switching means, and a control switch for said switching supply circuit, said control switch having an actuating arm in the path of travel of an article to be printed upon and being positioned in advance of said printing station, said time delay switching means providing a delayed opening switch to maintain said actuating means energized during the reciprocal movement of said type and the movement of said type in a direction parallel to the path of the moving article, whereby said type is movable into printing engagement and held in printing engagement while moving with the article being printed.

6. In apparatus of the character described, the combination of conveyor means for moving a series of articles in a longitudinal path of travel past a printing station, a reciprocable head disposed at said station, a type holder secured to said head supporting type for movement with said head into printing engagement with a moving article and slidable for a limited path of travel in a direction parallel to said path of movement with an article during said printing engagement, electrical actuating means for reciprocating said head, an electrical supply circuit for said actuating means, a quick operating switch and a delayed opening switch in series in said supply circuit, control means

for said switches comprising means operable by the movement of an article toward and in advance of said printing station to open said quick opening switch and close said delayed opening switch and operable when said article has moved into alignment with said station to close said circuit through said delayed opening switch and under its control to thereby energize said electrical actuating means, said delayed opening switch providing a delay

sufficient to maintain said actuating means energized during the reciprocal printing stroke of said type into printing engagement with said article and the movement of said type while in printing engagement with the moving article and to de-energize said actuating means before said type has reached the limit of its travel.

No references cited.