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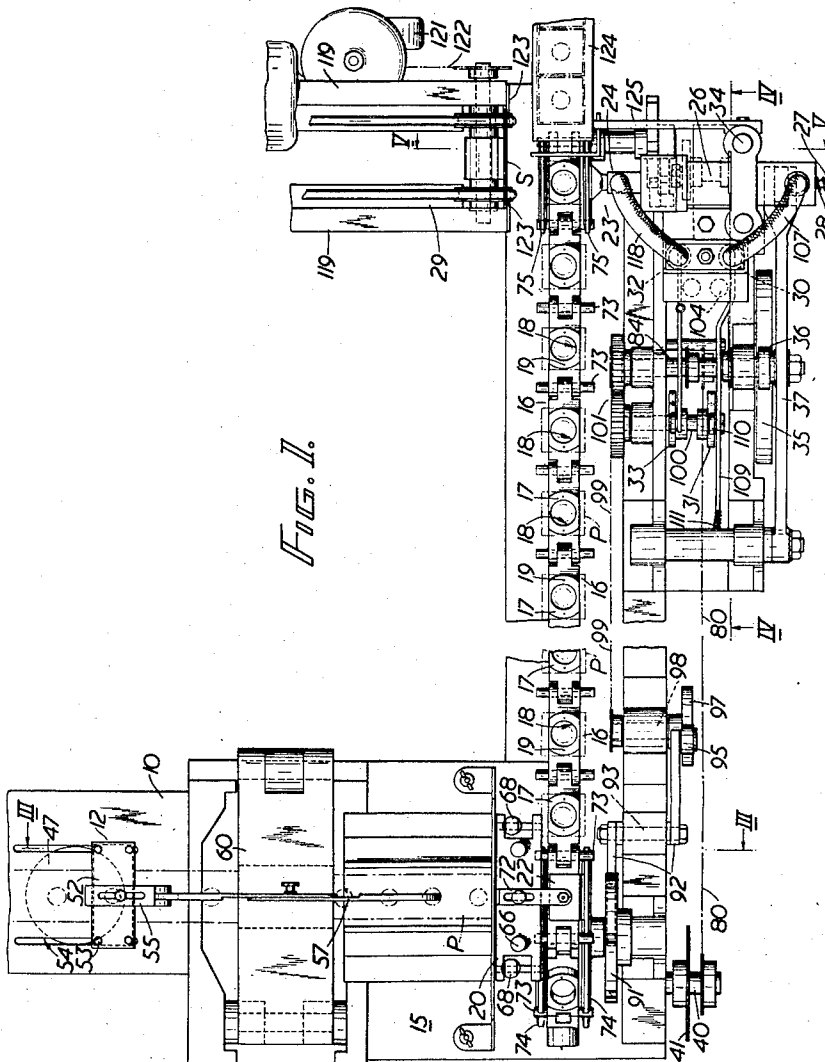
E. W. D. RIGG

2,866,307

MACHINES FOR PRINTING AND PACKAGING

Filed Dec. 1, 1953

4 Sheets-Sheet 1



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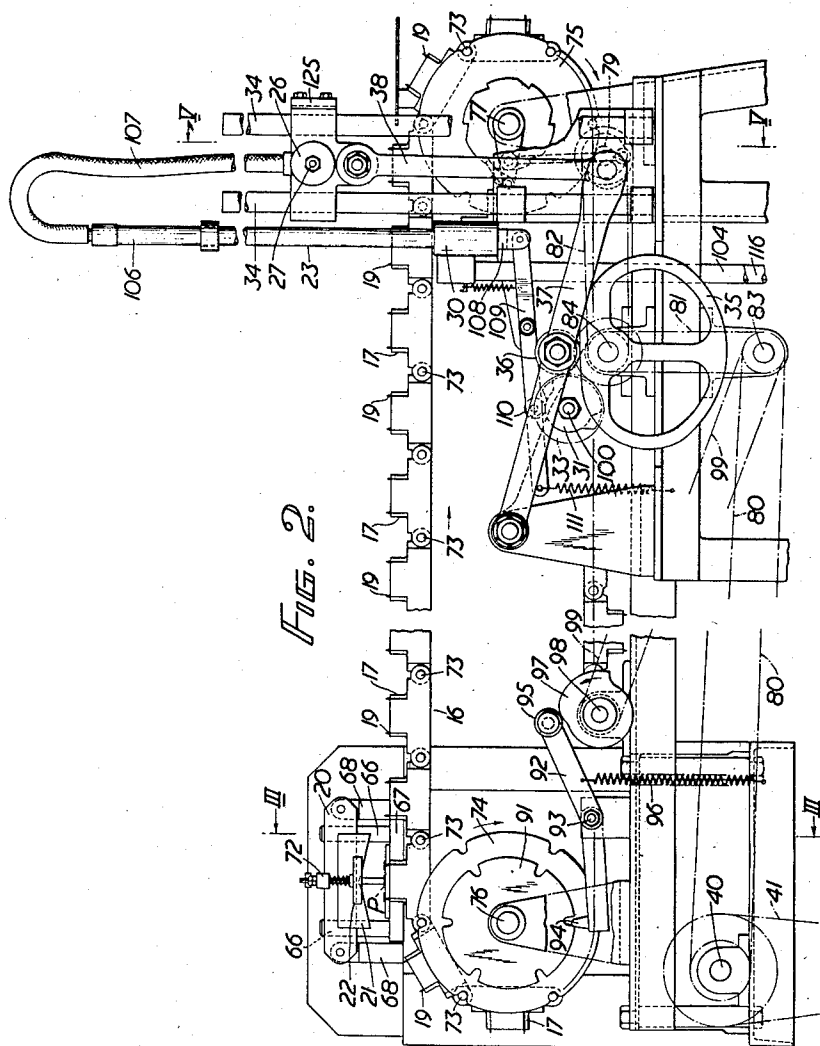
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4 Sheets-Sheet 2



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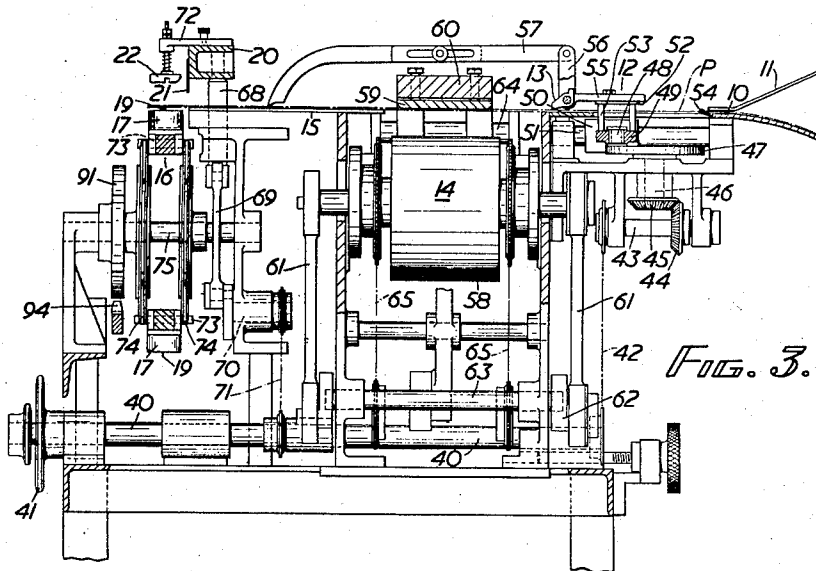


FIG. 3.

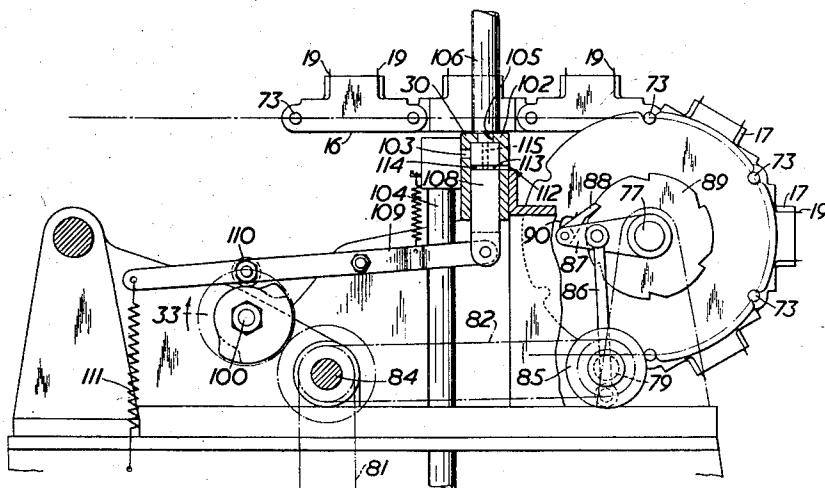


FIG. 4.

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4 Sheets-Sheet 4

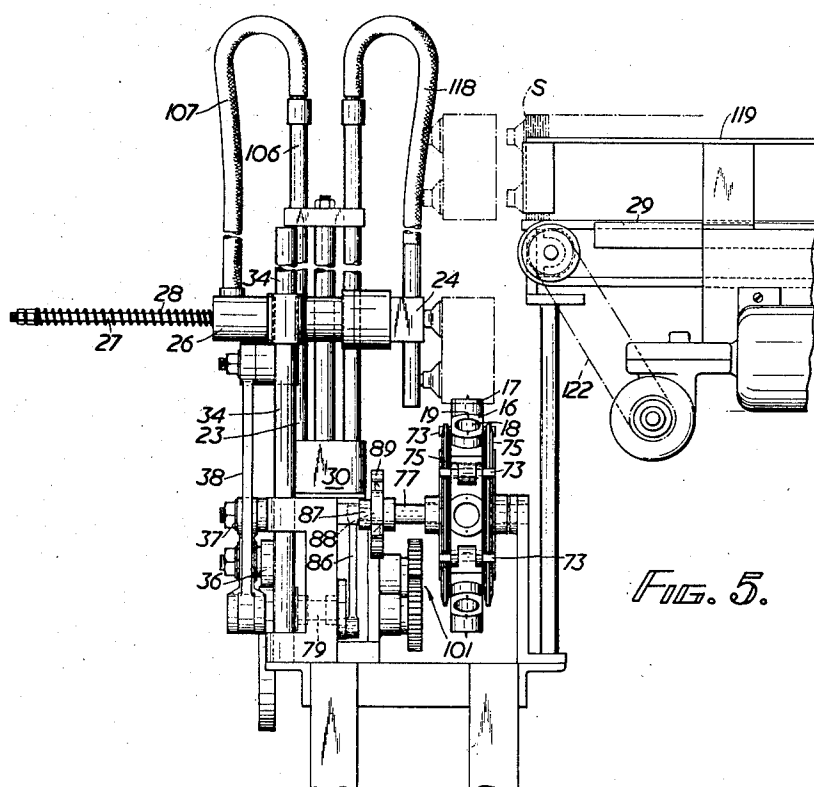


FIG. 5.

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MACHINES FOR PRINTING AND PACKAGING

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2 Claims. (Cl. 53—186)

The present invention relates to machines for printing and packaging and is particularly concerned with a machine for producing a package of a type commonly used for electric lamps.

A package of this type comprises an open-ended sleeve, generally square in cross-section and made of cardboard, in which a lamp is held by a so-called platform which fits within the sleeve and has a central hole through which the cap of the lamp passes. The platform is a close fit in the sleeve and the lamp cap fits closely in the platform, the periphery of its central hole being provided with radial slots to facilitate the entry of the lamp cap. It will be realized that a package of this type can be used for articles other than electric lamps—wireless valves, for example.

The platforms are normally printed with the trade mark of the manufacturer and other standard information, but it is commonly desired to overprint the platforms with further information, for example the voltage of the lamp or its type of filament, which may vary from batch to batch so that it is not desirable to print this further information with the standard information but rather to overprint the additional information as the platforms are required for use.

The present invention enables a machine to be provided which performs the overprinting operation on a platform, and then after a lamp has been inserted by hand, automatically fits a sleeve over the lamp and platform to produce the packaged lamp.

In accordance with the invention, a machine for producing a package of the type specified comprises means for feeding platforms in succession through a printing mechanism to a movable multi-position holder. This holder is adapted to hold securely at each position thereof, a platform with its hole over an opening in the holder. Into a platform so secured a lamp or other article to be packaged can be inserted and a sleeve fitted over the article and platform.

One embodiment of the invention is a machine which broadly comprises means for feeding platforms in succession to a printing mechanism and then to a first station, means for moving each position of a multi-position holder in turn to said first station, means at said first station for firmly but removably securing a platform to the holder in such a manner that an article can be inserted in the hole of the platform, said holder moving means being adapted to bring each holder position in turn to a second station, and means at said second station for fitting a sleeve over the article and platform.

It is convenient for the platforms initially to be connected together so as to be in the form of a strip, the strip being fed to the printing mechanism. At the first station means are provided for severing each platform from the strip as that platform is secured to the holder.

In order that the invention may be more fully and clearly understood, one embodiment thereof will now be described with reference to the accompanying drawings. This embodiment, which is given by way of example

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only, is a lamp packaging machine which includes mechanism for overprinting the platforms.

In the drawings:

Figure 1 is a plan view of the machine;

Figure 2 is a side view of the machine;

Figure 3 is a cross-sectional view taken on the lines III—III of Figures 1 and 2;

Figure 4 is a sectional side view on an enlarged scale of part of the machine taken on the lines IV—IV of Figure 1; and

Figure 5 is an end view of the machine taken on the lines V—V of Figures 1 and 2.

It should be explained that the platforms to be handled by the machine are joined end-to-end in the form of a strip. The joints are preferably perforated to facilitate subsequent separation and the strip of platforms is arranged in fan-folded manner. It will be understood that the platforms are printed with standard information but require overprinting with additional information as previously explained.

Referring to the drawings and more particularly Figures 1 and 3, the machine comprises a horizontal table 10 on which rests the end of a fan-folded strip of platforms disposed below the curved edge of the table. The position of the strip on the table is indicated in dotted lines P. A spring blade 11 holds the strip against the table. The strip is fed by means of a reciprocating pusher 12 having a finger 13 which engages a hole in a platform during the forward, feeding stroke of the pusher (from right to left in Figure 3) and slides freely over the strip during the return stroke.

Overprinting is effected on the undersurface of the platforms by a printing mechanism 14 while the strip is stationary during the return stroke of the pusher.

As feeding continues, the foremost, overprinted platform passes over a second table 15 until in due course it is situated directly above an endless conveyor 16 (see Figure 2 also). This conveyor, which constitutes the multi-position holder, comprises a series of blocks 17 hinged together and having an opening or recess 18 with two pins or spikes 19 projecting upwardly from the upper surface of the block.

The platform severing means comprises a member 20 adapted to be reciprocated vertically and carrying a cutter blade 21 and a spring-loaded pressure member 22. The downward stroke of the member 20 takes place while the platform strip is stationary and effects the severing of the leading platform by the blade 21, which platform is at the same time impaled on the pins 19 by the pressure member 22.

The conveyor 16 is given a step-by-step movement (left to right in Figure 1) which is synchronised with the reciprocating movements of the feeding and severing means and it is arranged that the conveyor is stationary while a platform is being secured thereto. The platform is thus accurately positioned with its hole over the recess 18. Lamps are inserted in the platforms by an operator along the horizontal run of the conveyor to a station at the other end of the conveyor. At this station means 23 (Figures 1, 2 and 5) are provided, which while the conveyor is stationary fit a sleeve over the lamp and platform, the thus packaged lamp being then removed by the operator.

The means 23 comprises a suction head 24 carried by a piston within a cylinder 26. The piston is attached to a rod 27 which extends through the end wall of the cylinder and carries a compression spring 28. The suction head is adapted to be reciprocated horizontally so that it can take the leading sleeve S in a hopper 29 and bring it to a position directly above the conveyor 16. The forward stroke of the suction head is brought about by supplying compressed air into the cylinder 26 through

a valve 30 operated by a cam 31, its return stroke is effected by the spring 28 when the valve 30 cuts off the compressed air supply and exhausts the cylinder 26 to atmosphere. Suction is applied to the suction head 24 through a valve 32 operated by a cam 33.

The cylinder 26 is given a vertical reciprocating movement in order to bring the sleeve carried by the suction head 24 down over the lamp; this movement being synchronised so as to take place while the conveyor is stationary, and then after suction has been released return the cylinder and head to the upper position prior to picking up the next sleeve. The cylinder is mounted on two vertical columns 34 and its reciprocation is produced by a cam 35 engaged by a roller 36 carried by a pivoted lever 37 which is connected to the cylinder by means of a link 38.

The various mechanisms described generally above are all operated by a single electric motor (not shown) mounted in the base of the machine beneath the printing mechanism 14. The structure and operation of the various mechanisms will now be described in greater detail; the manner in which these mechanisms are driven by the motor will be apparent from what follows.

A horizontal shaft 40 (Figures 1, 2 and 3) is connected to the motor shaft (not shown) by a chain drive 41. The feeding pusher 12 is reciprocated from the shaft 40 as follows. A chain drive 42 (Figure 3) connects shaft 40 to a shaft 43 which carries a bevel gear 44 meshing with another bevel gear 45 carried by a vertical shaft 46. Fast on the upper end of this shaft 46 is a disc 47 projecting from the top surface of which is a stud 48. A bar 49 has at either end a sleeve 50, each of which is slidably mounted on a horizontal rod 51 so that the bar may be reciprocated transverse to its length. This bar is provided with a longitudinal slot in which the stud 48 is accommodated. Thus each revolution of the disc 47 will produce a complete reciprocation of the bar 49 (shown in Figure 3 in its forward position).

The bar 49 is attached to a plate 52 above the table 10 by means of bolts 53 passing through slots 54 in the table. To this plate 52 another plate 55 carrying the finger 13 is fastened so as to be adjustable in the direction of feed. The plate 55 also carries a short vertical arm 56, to the upper end of which an arm 57 is hingedly attached so as to permit it to be lifted for access to the printing mechanism. The forward end of the arm 57 is formed as a second finger adapted to engage the portion of the platform strip on the table 15. The length of the arm 57 is adjustable and it is arranged that the forward finger is slightly out of step with the finger 13 so as to ensure that a platform hole is engaged by one or other finger should there be any error in hole spacing.

The printing mechanism 14 comprises a drum 58 (Figure 3) carrying type at the top, the platforms passing between the type and a pressure pad 59 carried by a hinged member 60. The strip of platforms is supported across the space occupied by the printing mechanism by two thin wires (not shown) stretched between the tables 10 and 15. A printing impression is effected as each platform in turn halts in the printing mechanism, by a reciprocating movement of the drum 58 effected by cranks 61 and eccentrics 62 on a shaft 63. This shaft is driven through gearing (not shown) by the shaft 40. Ink distributor rollers such as 64 are also rotated around the drum 58 from the shaft 40 by means including chain drives 65. The inking mechanism is of a wholly conventional nature and it is not thought necessary to show or describe it in full.

The member 20 carrying the cutting blade 21 and pressure member 22 is also driven from the shaft 40. Member 20 is slidably mounted in vertical posts 66 (Figures 1 and 2) secured to a plate 67 which is adjustably attached to the framework of the machine so as to permit of adjustments in accordance with platform size. Member 20 is attached by rods 68 to a crank 69 (Figure 3)

eccentrically connected to a shaft 70 rotated by shaft 40 through a chain drive 71. The pressure member 22 is carried by an arm 72 adjustably attached to the member 20 so that its position can be varied relative to that of the blade 21.

The blocks 17 forming the conveyor 16 are hingedly connected by pins 73, the ends of which are received in notches in two pairs of wheels 74, 75 fast on shafts 76, 77 respectively. The ends of the pins carry rollers 78 which travel on rails (not shown) along the horizontal runs of the conveyor. The conveyor is driven in the desired step-by-step fashion by imparting an intermittent rotation to the shaft 77. To this end a shaft 79 is connected to the shaft 40 by means of chain drives 80, 81 and 82 and intermediate shafts 83 and 84. To an eccentric 85 (Figure 4) fast on shaft 79, one end of a crank 86 is pivotally attached, the other end of this crank being pivotally attached to an arm 87 rotatably mounted on the conveyor shaft 77. The arm 87 also has pivoted thereon a pawl 88 which is held against a ratchet wheel 89 fast on shaft 77 by a small spring 90. It will be clear that as shaft 79 is continuously rotated from shaft 40, the arm 87 is given an angular to-and-fro motion. From the position shown in the drawings, the arm moves clockwise and the pawl 88 which is engaging a tooth of the ratchet wheel 89, causes a partial revolution of shaft 77. During the return movement of the arm 87 the pawl slides over the ratchet wheel 89, no rotation of shaft 77 taking place, until it engages the next tooth of the ratchet wheel and the operation is then repeated.

A mechanism is provided to positively arrest the conveyor in each position and to avoid any risk of shaft 77 being rotated during return movement of pawl 88. This mechanism comprises a notched wheel 91 (Figure 2) fast on shaft 76. A lever 92 pivoted at 93 has at one end a projection 94 adapted to enter the notches in wheel 91, and at the other end a roller 95. By means of a spring 96, the roller 95 is held against the periphery of a cam 97 on a shaft 98. This shaft is connected by a chain drive 99 to the shaft 83. The contour of the cam 97 and its phasing relative to the motion of the conveyor are such that the projection 94 engages in a notch of a wheel 91 while the conveyor is not being driven. Slightly before the next step of the conveyor motion starts, the projection leaves the notch and is held off the wheel 91 until the conveyor movement again ceases; the projection then enters the next notch.

The mechanism for producing vertical movement of the suction head 24 has already been sufficiently described and it is only necessary at this stage to point out that cam 35 is fast on shaft 84. The cams 31, 33 for operating valves 30, 32 are mounted on a shaft 100 which is driven from shaft 84 by toothed gearing 101. The valve 30 for controlling the supply of compressed air to cylinder 26 comprises a hollow cylinder 102 (Figure 4) having an inlet port 103 connected by means of a pipe 104 to a suitable source of compressed air (not shown). The cylinder also has an outlet port 105 communicating with a vertical pipe 106 to which the interior of the cylinder 26 is connected by a flexible tube 107. Within the cylinder 102, a plunger 108 is mounted for vertical sliding movement, the lower end of the plunger being pivotally attached to a lever 109. The lever carries a roller 110 which is held against the periphery of cam 31 by means of a spring 111. As the cam rotates the plunger is moved between the closed position shown and a lower position in which the port 103 is uncovered so that pipes 104 and 106 are in communication through cylinder 102 and compressed air is supplied to the cylinder 26. It is necessary that when the valve is closed the cylinder should be exhausted to atmospheric pressure to ensure that the piston is returned by the spring 28. To this end, cylinder 102 is provided with a bleeder hole 112, which in the closed position of the valve, communicates

through circumferential groove 113, radial bores 114 and axial bore 115 in the plunger 108, with outlet port 105.

The arrangement and operation of valve 32 and its associated parts is similar to that of valve 30, except, of course, that it is connected by pipe 116 to a vacuum pump (not shown) and by pipe 117 and flexible tube 118 to suction head 24.

It will be clear that the cams 31 and 33 are timed so that the corresponding valves are opened and closed at the required times as previously explained.

As mentioned above, the sleeves are stored in hopper 29, from which they are taken one at a time by suction head 24. The sleeves are folded flat and are stacked one behind the other in the hopper between two side rails 119. The sleeves are "broken" along the corner lines before being placed in the hopper to ensure that they open out correctly when removed by the suction head. The sleeves are supported by two endless bands 120 which are continuously driven by a small electric motor 121 and associated gearing 122. These bands keep the foremost sleeve continuously against stops 123 at the front of the hopper. The suction pads of the head 24 grip one side of the foremost sleeve and as the head moves horizontally away from the hopper this sleeve is removed from the hopper. During this horizontal movement of the head, the sleeve, already "broken" as mentioned above, is opened out and squared up by means of a blade 124 which engages the forward side of the sleeve adjacent that gripped by the suction pads. This blade 124 is carried by an arm 125 fastened to cylinder 26. Thus as the sleeve is brought down over the lamp and platform, it is held in its square, opened-out state by the blade 124 which moves down with the suction head.

A machine such as that described above can overprint the platforms and facilitate the packaging of the lamps at a speed which far exceeds the rate at which such overprinting and packaging has been performed before, these operations having previously been separate and the packaging done entirely manually.

It will be appreciated that the machine described above can be modified in various ways without departing from

the scope of the invention, and those skilled in the art will readily realize that alternative mechanisms can be substituted for those described.

I claim:

- 5 1. A machine for use in packaging electric lamps in sleeves with the aid of platforms each having a hole in it, comprising means for feeding the platforms in succession to a given station, a conveyor having a series of spaced holding means, said conveyor being adapted to
- 10 move each successive holding means to said given station, and means at said given station for firmly but removably securing each successive platform to each successive holding means, whereby with such platform secured to such holding means, a lamp may be inserted in the hole in
- 15 each successive platform and a sleeve fitted over each successive lamp and platform.

2. A machine for use in packaging electric lamps in sleeves with the aid of platforms, each having a hole in it, comprising means for feeding the platforms in succession to a given station, a conveyor having a series of spaced holding means, said conveyor being adapted to move each successive holding means to said given station and subsequently to another station, and means at said given station for firmly but removably securing each successive platform to each successive holding means, whereby a lamp may be inserted in the hole in each successive platform, and, at said other station, a sleeve may be fitted over each successive lamp and platform.

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