March 25, 1958 P. D. DALE ET AL 2,827,826

PHOTOGRAPHIC PRINTING APPARATUS

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Fig. 1

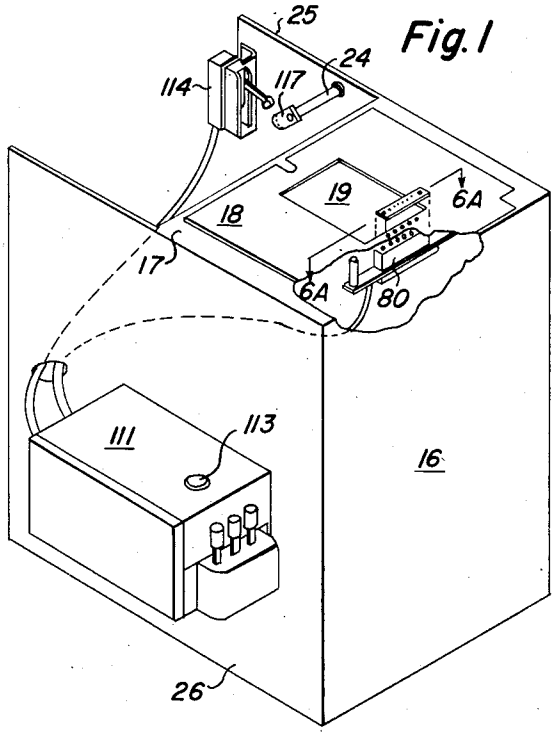


Fig. 2

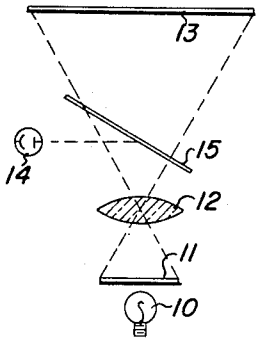


Fig. 3A

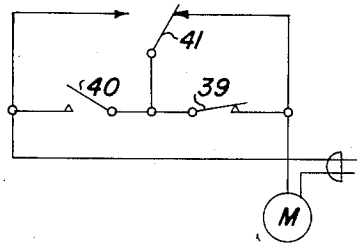
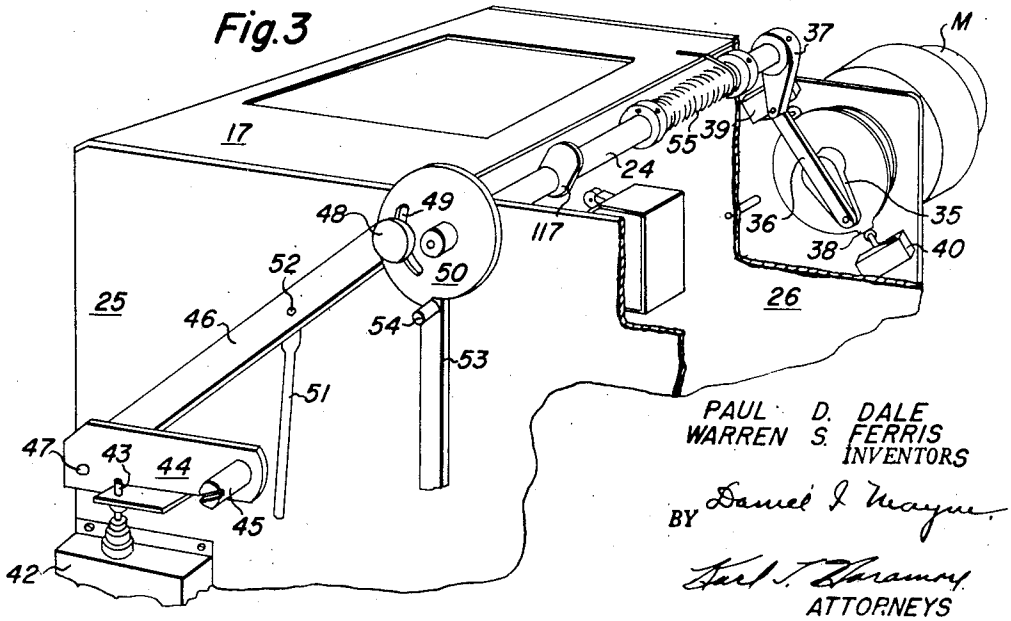


Fig. 3



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PHOTOGRAPHIC PRINTING APPARATUS

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Fig. 4

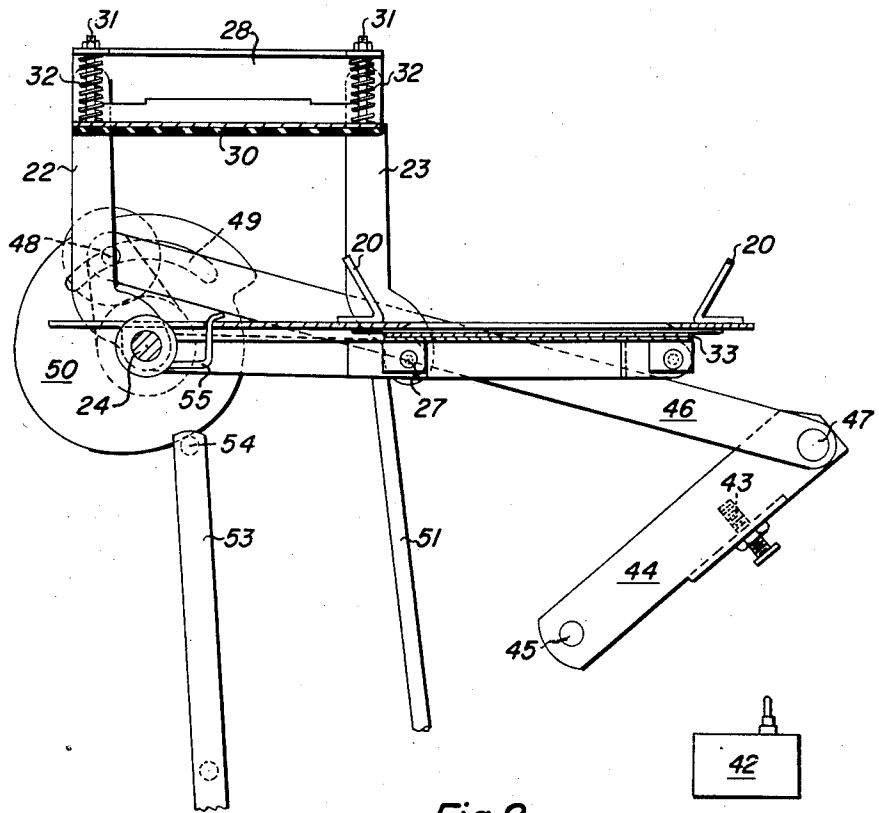


Fig. 8

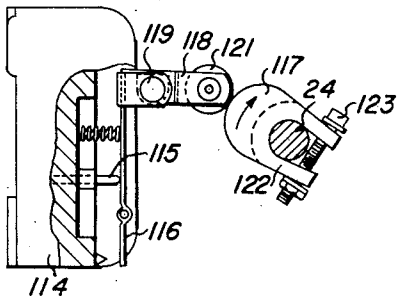
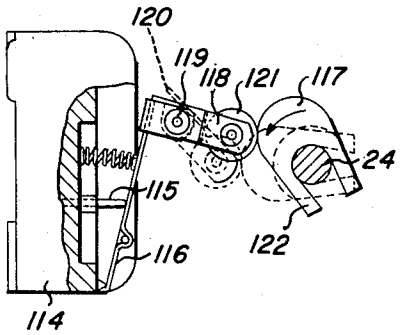


Fig. 7



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Fig. 5

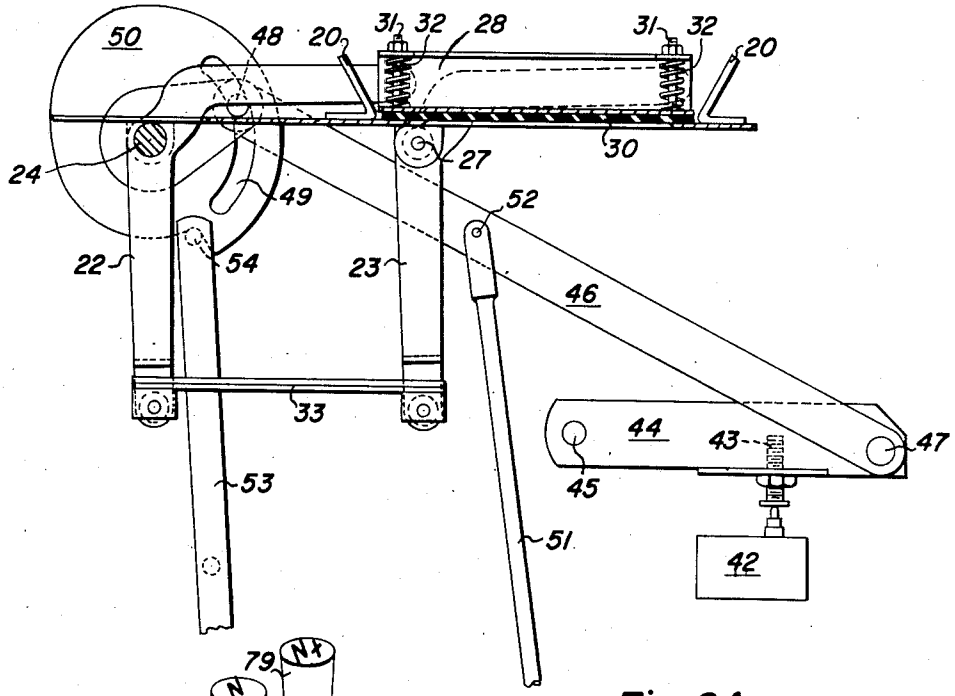


Fig. 6

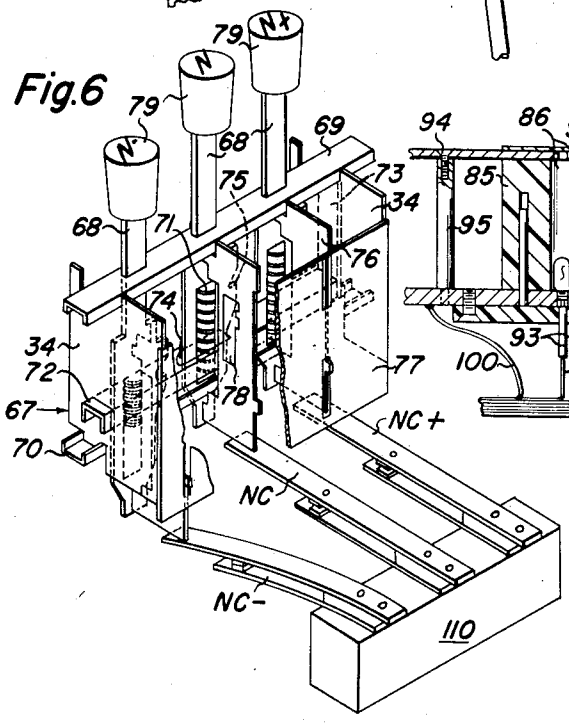
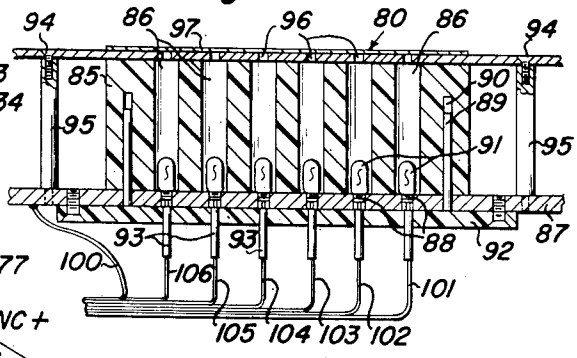


Fig. 6A



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Fig. 10

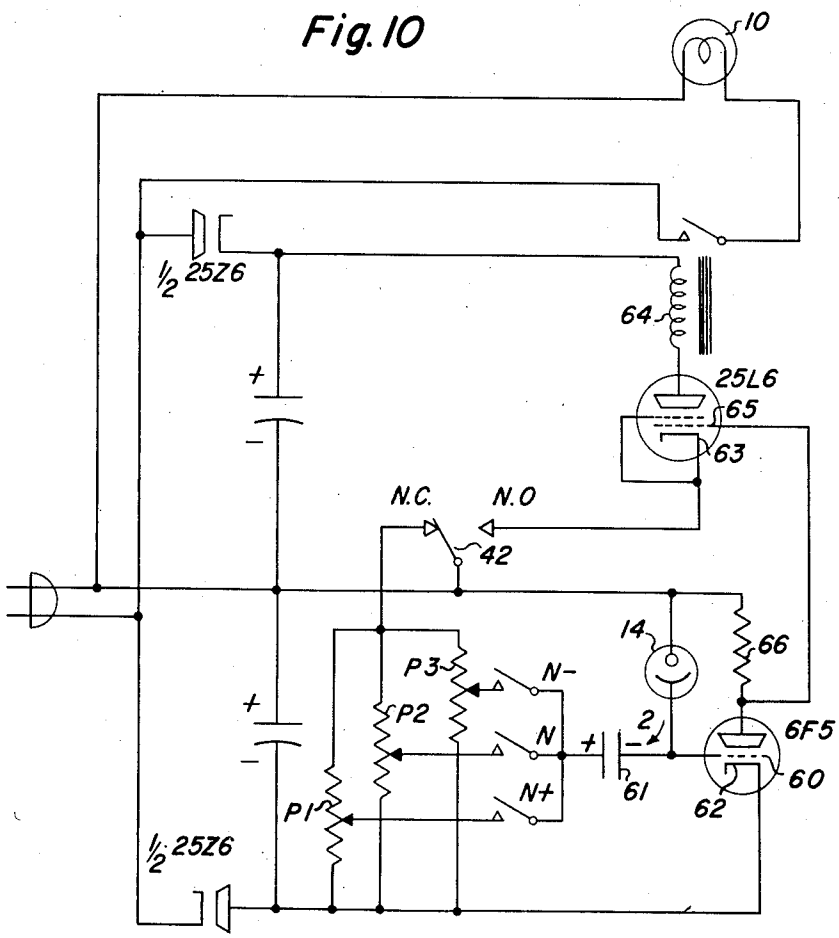
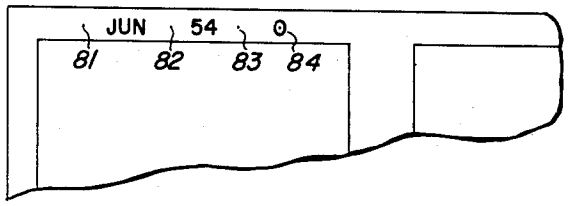


Fig. 9



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PHOTOGRAPHIC PRINTING APPARATUS

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Fig. 12

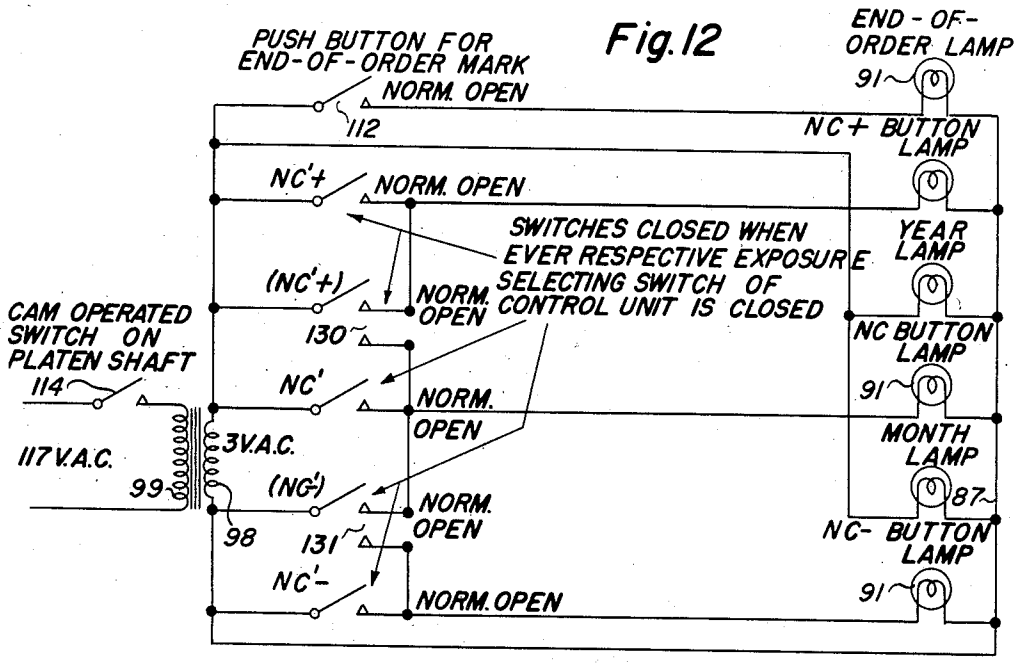
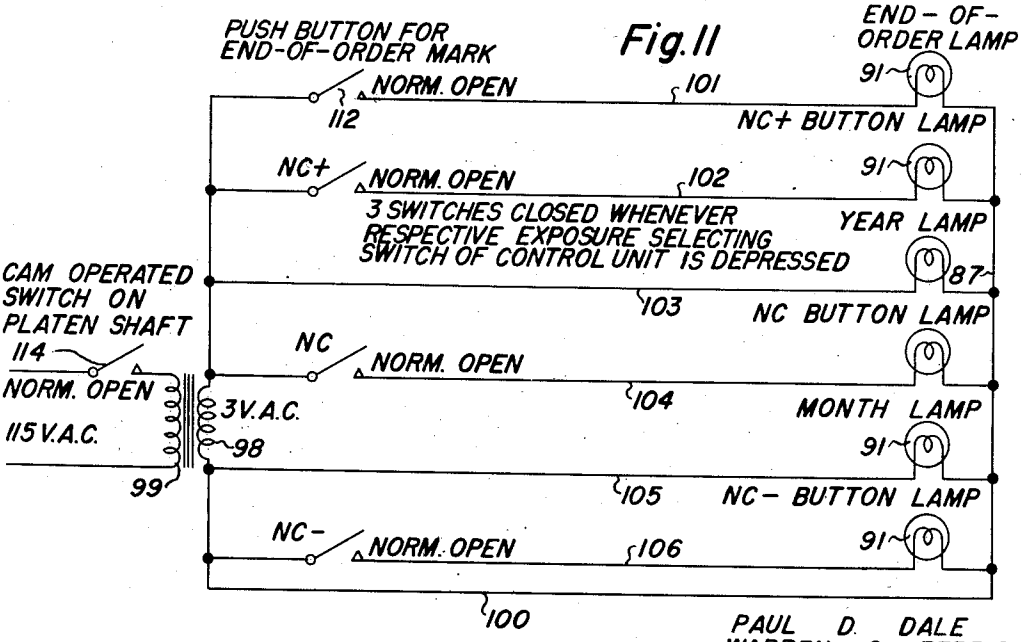


Fig. 11



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United States Patent Office 2,827,826
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2,827,826

PHOTOGRAPHIC PRINTING APPARATUS

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Application May 7, 1954, Serial No. 428,236

3 Claims. (Cl. 88—24)

The present invention relates to photographic printing apparatus capable of producing different exposure conditions, and particularly to the combination with such a printing apparatus of a code identifying printer which will print an identifying code on the margin of the print from which one can later identify the particular exposure given to said print.

In the photofinishing art automatic printers are used by which relatively unskilled operators are able to turn out photographic prints at a relatively rapid rate. In order to make satisfactory prints from all kinds of negatives, these printers are provided with means for selectively varying the exposure and by means of which the operator can adjust the exposure after having inspected the negative and judged what exposure correction might be necessary to produce a satisfactory print from a particular negative. At the end of the day, or after a quantity of prints have been made on the printer, the prints are then processed to develop out the latent images. Upon inspection of the finished prints, there are generally found many which are not satisfactory and which require a reprinting. If the prints have no identification code on them to indicate what exposure was given them in the printing operation, the inspector has no way of judging what correction is required and may even order a reprint of the negative at the same exposure which was originally given.

The primary object of the present invention is to provide a photographic printer which is capable of giving different exposures through operation of a selector means with a code identifying means which will record on the final print a code from which the exposure given during printing can be readily identified.

A further object is to provide a photographic printing apparatus with a print coding device which operates automatically and requires no separate operation or thought on the part of the person operating the printer.

Another object is to provide a print coding device which is so designed that it can be supplied as an accessory and can be readily combined with existing printing apparatus.

And still another object is to provide a print coder which is in effect a miniature multi-compartment printer positioned in the printing apparatus to expose identifying data on the margin of the print, each compartment constituting a miniature printer including its own lamp and a transparency bearing an identification code corresponding to one exposure setting of the main printer which is printed on the margin of the print when the lamp is illuminated.

And yet another object of the invention is to provide each lamp circuit of the code printer with a normally open switch and to combine these switches with the exposure selector of the main printer in such a way that a certain one of the lamps of the code printer will be ready for illumination for each setting of the exposure selector. The actual illumination of the appropriate

lamps of the code printer is then effected by closure of a switch in the power supply for the individual lamp circuits upon the operation of the printing apparatus to make the primary exposure.

A still further object is to combine the code printer with the main printer in such a way that the switch controlling the energization of the lamps of the code printer is operated by a moving part of the main printer whereby the code exposure is effected automatically by normal operation of the main printer and requires no separate thought or act on the part of the operator.

A further object is to provide a code printer by means of which a distinctive mark can be placed on one of the end prints of each roll of negatives for reference when the strips are cut into individual prints, and/or by means of which the month and year when the print was made can be recorded on the print as a service to the customer and also as a means for orienting and disguising the identifying code marks.

The novel features that we consider characteristic of our invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and its methods of operation, together with additional objects and advantages thereof, will best be understood from the following description when read in connection with the accompanying drawings, in which:

Fig. 1 is a schematic perspective view of the top portion of a conventional projection type photographic printer incorporating a code printer combined therewith in accordance with a preferred embodiment of the present invention;

Fig. 2 is a diagrammatic view, on a reduced scale, showing the entire optical path of a projection printer of which only the top portion is shown in Fig. 1;

Fig. 3 is an enlarged perspective view of the top portion of the printer from the rear and showing the motor driven part of the printer which operates the printer platen and instigates the exposure;

Fig. 3A is a schematic wiring diagram showing how the motor for driving the printer platen between its two positions is automatically stopped when the platen reaches each of its two positions and is manually started from each position;

Fig. 4 is a side elevational view showing the platen moving mechanism of the printer, and with the platen in its raised position above the printing plane;

Fig. 5 corresponds to Fig. 4 but shows the platen in a lowered position;

Fig. 6 is an enlarged perspective view showing the push buttons for selecting the printing exposure and the combination thereof with the lamp switches of the coding printer;

Fig. 6A is an enlarged longitudinal section taken substantially on line 6A—6A of Fig. 1, and showing the code printer in relation to the exposure plane;

Fig. 7 is an enlarged detail, partly in section, showing how the operating arm of the normally open switch in the power supply of the code printer lamps is constructed so that the switch is not closed during the movement of the oscillating shaft of the main printer in the direction commensurate to a lifting of the platen;

Fig. 8 is a view similar to Fig. 7 but showing how the switch is closed when the shaft oscillates in the other direction to instigate an exposure;

Fig. 9 is a plane view of a processed print showing how the code applied thereto, and indicating a certain exposure, might appear;

Fig. 10 is a schematic wiring diagram of the electronic exposure control of the printer;

Fig. 11 is a schematic wiring diagram of the code

printer when used with a primary printer having three push buttons for controlling the exposure; and

Fig. 12 is a schematic wiring diagram of a code printer which might be used with a primary printer having five push buttons capable of producing five different exposure conditions.

Generally speaking, the present invention has to do with providing a conventional photographic printing apparatus which has means allowing the operator to selectively vary the exposure with a print coder for recording code marks on the finished photographic prints to indicate which exposure the operator selected in making the print. This print coder is made in the form of an accessory so that it can be readily combined with any existing printer. When combined with a printing apparatus, it functions automatically in response to the normal printing operation and requires no additional thought or operation on the part of the operator.

While this print coder can be readily combined with any type of conventional printer (projection or contact) and having any type of selective exposure control (electronic or manual), for purposes of disclosure we have shown it combined with a well-known type of projection printer having an electronic exposure control including a photoelectric cell. As schematically shown in Fig. 2, such a printer comprises a printing lamp **10** positioned to illuminate a record **11** to be printed, which record is imaged by a projection lens **12** on a light-sensitive photographic material **13** supported in the exposure plane. The duration of the exposure is controlled by an electronic exposure control circuit, to be later described, which includes a light-sensitive cell **14** onto which light from the projected record **11** is directed by a beam splitter **15**.

The upper part of the printing apparatus includes a housing **16** having a top wall **17** provided with a light opening and is adapted to support different sized paper or printing masks **18** having a printing aperture **19**. These printing masks are adapted to support the light-sensitive paper in the exposure plane, and paper guides **20** may be provided at the margins of the printing mask to help in locating a sheet or web of paper in proper relation to the printing aperture. In a printer adapted for handling cut sheet paper, as the one disclosed happens to be, a paper platen assembly is provided which is adapted to be moved between a raised, or loading, position and a lowered, or printing, position. This platen assembly, see Figs. 4 and 5, comprises two pairs of substantially L-shaped platen supporting arms **22** and **23**, there being one pair of these arms at opposite sides of the platen. The rearmost arm **22** of each pair is fixed at its intermediate point to an oscillatable drive shaft **24** which extends across the back of the housing adjacent the rear top corner thereof and is journalled in opposite side walls **25** and **26** of the housing. The front arm **23** of each pair is journalled at **27** in the side wall of the housing. Pivotally mounted at the upper end of each of the arms **22** and **23** is a platen supporting bracket **28** which moves between the raised position shown in Fig. 4 and the lowered position shown in Fig. 5 when the shaft **24** is oscillated substantially through 90°. The platen pad **30** is mounted on this platen bracket **28** by four screw studs **31** located at the four corners, said platen pad being slidable on said studs and urged downwardly by coiled compression springs **32** surrounding the studs **31**. This spring mounting of the platen allows the platen to hold the paper down flat in the exposure plane with only spring pressure even though the platen moving mechanism is adjusted so as to force the platen too hard against the printing mask. Pivotally mounted on the other ends of L-shaped arms **22** and **23** is supporting plate **33** which moves out of the projection beam when the platen is lowered, see Fig. 5, and moves up to cover the aperture **19** in the printing mask when the platen is raised, see Fig. 4. The primary purpose of this supporting plate is to prevent the operator from pushing the sheet of paper through the aperture in the printing mask when loading or unloading the printer, although it will serve to some extent as a shutter to prevent any light from striking a new sheet of paper during the negative judging operation.

While this platen could be manually operated, it is common practice to drive it between its two positions by means of a motor. To this end, as shown in Fig. 3, a small motor M is mounted on the outside of one side wall of the housing **16** and drives a crank **35** which is connected by a link **36** to an arm **37** on the end of shaft **24**. Through this drive connection a complete rotation of the motor shaft, or motor crank **35**, will only oscillate shaft **24** through substantially 90°, and cause movement of the platen between its two positions. After the negative and sheet of paper are placed in the printing plane, a switch is operated to make the exposure. This involves moving the platen to its paper holding position, turning on the printing lamp for a selected time after which the printing lamp is extinguished and the platen is moved to its raised position. While ordinarily the motor driving the platen is automatically started at the completion of the exposure to raise the platen, since such a system is rather complicated and is outside the present invention, we have chosen to show this function as being more or less manually accomplished by a simple structure. To this end, the motor crank **35** has fixed thereto a disklike cam having a high point **38** which is adapted to successively engage, and open, normally closed switches **39** and **40**, see Figs. 3 and 3A. As shown in Fig. 3A, these two switches are connected in series in one branch of the supply circuit to the motor M and are selectively shunted by a manually operated single-pole double-throw switch **41** also connected in the motor supply circuit. When the switches are in the condition shown in Figs. 3 and 3A, the motor has stopped with the platen in a lowered position. After the exposure is completed, all the operator has to do is throw the switch **41** to its other position and the motor will start and raise the platen. When the platen reaches its full raised position, the cam disk will have rotated 180° and the high point **38** thereon will engage and open switch **39** whereupon the motor will again stop. To start the next exposure, the switch **41** will then be thrown back to the position shown in Fig. 3A at which time the motor will start, lower the platen, and will be stopped with the platen in the lowered position upon the opening of switch **40**.

In order that the exposure will be automatically started when the platen reaches its lowered position without any other operation being required on the part of the operator, the switch **42**, which is a single-pole double-throw switch, and is used for instigating energization of the printer lamp **10**, as will be fully hereinafter described, is mounted on the side wall **25** of the housing. This switch is adapted to be engaged and moved from its normal position by an adjustable screw **43** fixed to arm **44** pivoted at one end on a stud **45** extending from the side wall of the housing. This arm is raised and lowered through a link **46** pivoted at one end **47** to the arm **44** and at the other end on an adjustable screw **48** movable in a slot **49** in a cam **50** fixed to the end of the drive shaft **24** of the platen. By virtue of this connection, when the shaft **24** moves to a position to raise the platen, arm **44** is pivoted upwardly about its pivot point and away from switch **42** whereupon it is allowed to open and shut off the printing lamp. Conversely, when the shaft oscillates in its other direction to a position where it lowers the platen, the arm **44** pivots downwardly to the position shown in Fig. 3 and wherein the screw **43** thereon engages and closes switch **42** to turn on the printing lamp. By adjusting screw **43** and/or screw **48**

in slot 49, the switch 42 can be made to open just as the platen reaches its lowered position. This drive linkage is also used to perform two other operations which are well known in commercial printing apparatus although not particularly pertinent to the present invention. First of all, a rod 51 pivoted to the link 46 at 52 extends downwardly and is connected to a swinging light shield, not shown, and which is swung into the projected beam when the platen is raised and is swung out of the beam when the platen is lowered. Secondly a bar 53 slidably mounted on the side wall of the housing is connected at its lower end to the pivoted member of a negative carrier, not shown, and a pin 54 on the upper end of this bar engages the periphery of the cam 50 so that the negative holder will be opened when the platen is up but closed when the platen is down. A counter-spring 55 is wrapped around shaft 24 and is adapted to act on the shaft in a direction to counterbalance any turning effect which might be produced thereon by the light shield and the pivoted member of the negative carrier attempting to move into their normal positions.

The printing apparatus can be provided with any one of several known exposure control systems which can be selectively adjusted to give different exposures and which can be selected by the operator after judging the character of the negative to be printed. For purpose of illustration we have shown the printer equipped with a photoelectric control unit having a timing condenser which controls the cut-off of the printing lamp. A schematic wiring diagram of such a control unit is shown in Fig. 10 and its function will be clear from the description of the operating cycle which will now be given.

Prior to the time an exposure is started, the switch 42 is in the normally closed position, and a voltage is developed across the three potentiometers P_1, P_2 and P_3 which renders the sliding tap positive with respect to the cathode of the 6F5 tube. The switch 42 is the one mounted on the side of the printer housing to be operated by the shaft 24. The three potentiometers are used to provide three different exposures which are designated N, N— and N+. The particular exposure chosen depends upon which of the three switches designated N, N— and N+ is closed by the operator. Since the grid 60 of the 6F5 tube is connected to one of the taps of the potentiometers when one of the switches N, N+ or N— is closed, the grid is also positive with respect to the cathode and the grid current flows in the tube—the positive direction of current flow is from the grid to the cathode—and the grid is acting like a plate. This current continues to flow until the timing condenser 61 becomes charged to a potential approximately equal to the potential difference between the cathode 62 of the 6F5 tube and the tap on the potentiometer connected into the circuit, with the grid side of the condenser negative with respect to the tap on the potentiometer. This charging process takes place very rapidly, and under normal operating conditions the circuit is in a state of equilibrium long before an exposure is started.

When the switch 42 is depressed upon lowering of the platen to make an exposure, the voltage is removed from the selected potentiometer whose tap assumes the potential of the cathode 62 of the 6F5 tube. Since the grid side of the timing condenser was negative with respect to the tap, it is now negative with respect to the cathode, and the 6F5 tube does not draw plate current. Actuation of the switch 42 also connects the cathode 63 of the 25L6 tube to ground. Since the 6F5 tube is not drawing plate current, the 25L6 grid is at ground potential, and the 25L6 draws plate current. This plate current causes the relay 64 in the plate circuit of the 25L6 tube to be energized and light the printing lamp 10. A portion of the printing light transmitted by the negative is directed to the phototube 14 by the beam splitter 15 and causes a current to flow. The positive direction of the current flow is from anode to cathode, as indicated on the diagram by arrow 2. This current discharges the timing condenser. When the potential difference across the timing condenser has dropped to less than cut-off for the 6F5 tube, this tube conducts and produces a voltage drop across its plate resistor 66 which renders the grid 65 of the 25L6 tube sufficiently negative to stop its plate current and the relay 64 drops out, turning out the printing light. The phototube current is proportional to the amount of light incident upon its cathode so that the timing condenser is discharged more quickly for the thinner negatives. The potentiometers control the amount of charge in the condenser and are adjusted to give three different exposure levels, one for normal negatives (N), one for negatives requiring less than normal exposure (N—), and the other for negatives requiring more than normal exposure (N+). When the exposure has been terminated, the switch 42 is released by movement of the platen to its raised position, and the cycle begins again with the charging of the timing condenser 61 by the grid current of the 6F5 tube.

The three switches N, N— and N+ may take the form of a commercially available selector switch of the type shown generally at 67 in Fig. 6.

As shown, this selector switch comprises three separate slides 68 which are guided to move vertically in slots in spaced top and bottom rails 69 and 70 respectively.

Each slide is normally moved in an upward direction by a coil spring 71 located between the slide and the bottom fixed rail. An intermediate rail 72 is mounted in slots in end plates 34 to move horizontally, and this rail is normally moved to the left, looking at Fig. 6, by a leaf spring 73 fixed at one end to one of the end plates 34 and having its free end engaging the end of the rail. Each of the slides 68 extends through an aperture 74 in the intermediate rail 72, said aperture having a straight edge which is adapted to snap into a notch 75 in the edge of each slide as it is depressed and thereby hold the slide in a depressed position. The edge of each slide adjacent the notch 75 therein is provided with a cam surface which cams the slidable rail 72 against its spring 73 just before the notch reaches a position to be engaged by the rail. This releases any slide which might be depressed and allows it to rise as another slide is depressed and latched in a depressed position. Each slide 68 has fixed thereto a wall 76 made of an insulating material, i. e. phenolic, and this wall serves to separate two switch contacts, not shown, which would be mounted on the rear phenolic wall 77 and to which the leads of the circuit they are to control would be connected. A conductor strip 78 is fastened to and extends through each wall 76 in such position that when the slide is depressed the conductor strip will engage and short the switch contacts on opposite sides of the wall and thus complete the circuit. The push buttons 79 fastened to the top of the respective slides 68 are marked with designations N, N— and N+ to indicate the different exposure selecting switches of Fig. 10 which they are adapted to control.

Coming now to the present invention, the print coder according to the present invention comprises a multi-compartment contact printer, indicated generally at 80 in Figs. 1 and 6A, which is mounted directly beneath the printing masks of the printer and adjacent the aperture 19 therein so as to print on the margin of the photographic print a latent image of a code by which the selected exposure can be identified upon development of the print. Such a coded print is illustrated in Fig. 9 where the first inconspicuous small dot 81 might indicate an exposure of N—, the second dot 82 an exposure N, and the third dot 83 an N+ exposure. The month and year designations are used primarily to disguise the code dots 81—82 from the purchaser's standpoint and to separate the three dots so

that they can be readily identified despite the fact that they are each the same. The last and final mark **84**, shown as a circle with a dot in the center, may be used to indicate the first or last print of a roll of film, or of a customer's order, in order to aid the processor to keep track of different orders.

Referring now to Figs. 1 and 6A, a code printer for making a code as shown in Fig. 9 consists of a block **85** having six holes **86** drilled therethrough. This block is supported on a metal plate **87** and properly located thereon with its holes aligned with the threaded lamp sockets **88** in the plate by pins **89** extending upwardly from the plate and slidably engaging corresponding bores **90** in the block. A small three-volt lamp **91**, of the type used on airplane instrument panels, is threaded into each of the lamp sockets in plate **87** and extends up into the holes in the block. Fixed to the bottom of plate **87** is a plastic plate **92** having bores adapted to frictionally receive the six jacks **93** having spring-pressed contacts for engaging the center contact of the lamps. The entire assembly is mounted on the underside of the top wall of the printer or printing frame **18** by means of flat headed screws **94** threaded into tapped ends of spacer sleeves **95** fixed to the metal plate **87**. The printing platen **18** has holes **96** aligned with the holes **86** in the block and it will be noted that these holes are much smaller than the holes in the block so that in effect the illumination at each hole in the printing frame, by virtue of the spacing of the lamps therefrom, will in effect be the same as illumination from a point source of light. These point sources of light are then transmitted through a transparency or negative **97** which carries the identifying data heretofore described and which data is properly superposed above the several printing compartments of the code printer. Any suitable means can be provided for locating the code-bearing negative above the coding printer, or the several compartments thereof, so that the separate data areas will register with the different ones of the six holes of the block, or the six different stations of the coding printer.

The different lights of this coding printer are hooked into a source of energy in such a way that the two lamps for printing the month and year of the code will be illuminated every time an exposure is made, the lamps for printing the N, the N+, and the N— designations will be illuminated only when the corresponding switches N+, N, and N— are closed, and the mark indicating the end or beginning of a customer's order will be lit only upon a separate choice of the operator. All of the lamps are so connected to their source of energy that they will be lit only when the platen is being lowered to make an exposure, and then, since the illumination for this code printer reaching the printing plane is so bright in comparison to that reaching the printing plane from the regular printing lamp as to require a shorter exposure time than the regular negative, the lamps of the code printer are only turned on for a portion of the time of the regular exposure of the negative being printed.

To this end, one terminal of each of the six code printer lamps **91** is connected to one side of a three-volt source of power which, in this instance, is the secondary **98** of a transformer whose primary **99** is connected to a 115-volt A. C. supply. Looking at Figs. 11 and 6A, this connection may include lead wire **100** and metal plate **87** into the sockets of which the lamps **91** are threaded. The second terminal of each lamp, or the center contact thereof, is connected to the other side of the transformer secondary by leads **101**, **102**, **103**, **104**, **105** and **106**, respectively. Leads **103** and **105** which connect the lamps **91** for printing the year and month, respectively, are unbroken. The leads **102**, **104** and **106** leading to the lamps **91** for printing the exposure code include normally open switches NC+, NC and NC— therein so that these lamps will be illuminated only when these respective switches are closed. In order that these last-mentioned three switches will be closed when the different exposures are selected, switches NC+, NC and NC— take the form, and are mounted, as best shown in Fig. 6. These three switches comprise three pairs of spring contacts mounted on a block **110** and which block is so fixed in a switch housing **111** on the side of the printer housing as to cause the upper and longer of each pair of the switch contacts to lie under the phenolic wall **76** extending from the respective slides **68** of the selector switch **67**. When each of the slides **68** is depressed to choose a given exposure time for the printer, the phenolic wall **76** thereof engages and closes the code lamp switch corresponding thereto. For example, in Fig. 6 the push button marked N— is shown depressed, indicating that an N— exposure has been chosen, and the phenolic wall **76** associated with this push button has engaged and depressed to a closed position the switch NC— in the circuit of the lamp in the code printer which will print the code on the final print corresponding to this exposure.

The lamp **91** of the code printer for printing the end-of-order code on the film is illuminated only when the operator selectively closes a normally open switch **112** in the circuit thereof. This switch may be operated from a push button **113** mounted in the top of the switch housing on the side of the printer, see Fig. 1, and this button must be held down by the operator while an exposure is being made.

So that none of the code lamps are turned on until the platen is being lowered and before the primary exposure has begun, the 115 volt circuit feeding the primary **99** of the transformer is provided with a normally open snap switch **114** of the type best shown in Figs. 7 and 8. This switch is of the well-known type which is closed by depressing a spring plunger **115** and which plunger can be depressed by applying pressure to the end of a spring loaded pivoted arm **116** to close the switch, see Fig. 8. In order to cause the lamps of the code printer to be automatically turned on at the time a primary exposure is to begin, we mount the switch **114** on the side wall of the printer housing in a position to be engaged and operated by a cam **117** fixed to and moved by the oscillatable platen shaft **24**. So that the switch will be closed only when the shaft is moved in a direction to lower the platen, the end of the switch arm **116** is provided with a lug **118** pivoted at **119** to the arm and including an extension **120** which positively engages the arm when engaged by the cam while moving clockwise, thus casuing the arm as a whole to be depressed to close the switch. This construction also permits the lug to pivot independently of the arm when engaged by the cam when moving in a counter-clockwise direction, see Figs. 7 and 8, with the result that the switch **114** is not closed at this time. A roller **121** is rotatably mounted on the end of lug **118** to be engaged by the cam **117**.

Since the light from the lamps **91** is relatively much brighter than the light used for making the primary exposure, it follows that the exposure time required in the code printer is less than that required in making the main print. Furthermore, since the printing conditions in the code printer are constant from one exposure to the next, whereas the exposure in the primary printer may be selectively varied, the exposure time in the code printer should remain constant. The switch **114** and the cam **117** should be relatively adjusted so that the cam in moving in a clockwise direction will engage and close the switch and then pass by the roller **121** to allow the switch to reopen. To provide for this adjustment the cam is adjustably mounted on shaft **24** by means of a yoke **122** and a clamping screw **123**, see Fig. 8. The duration of exposure in the code printer will depend upon the contour of the cam **117** or how long the cam holds the switch **114** closed before passing beyond the roller **121**. We have

found that a satisfactory operating condition exists when the cam **117** closes switch **114** before switch **42** is operated by screw **43** on the arm **44** which starts the primary exposure. The necessary overtravel of shaft **24** to allow cam **117** to pass beyond roller **120** and thus allow switch **114** to reopen will be obtained by virtue of the four compression springs **32** acting on the platen. In the event the photographic paper is being fed across the printer top in the form of a long web from a supply roll to a take-up roll, as is well known, then the strip of paper can be held onto the printer top under sufficient tension to keep the paper in good enough contact with the code negative to insure a good contact print even though the platen is not holding the paper down on the code negative during the exposure of the printing code. In fact, the present invention could be combined with a projection printer having a roll paper head of the type shown in U. S. Patent 2,541,013 in which the web of paper is merely fed across the printing plane under tension and held in contact therewith by a floating platen rather than by the use of an oscillatable platen of the type here disclosed. In such a case the oscillatable shaft **24** would not need to raise and lower the platen but would then be used only to operate switch **42** to start the exposure, to open and close the negative carrier, and to move the light shield from the light beam, as is well known.

When using the three button exposure control shown in Figs. 1 and 11, it is common practice to depress two adjacent push buttons simultaneously in order to obtain an intermediate exposure step. This will light the corresponding two lights **91** on the code printer. To avoid the necessity of having to push two buttons to obtain an intermediate exposure a five button exposure switch arrangement might be provided to obtain these five steps by merely pushing a single button for each step. In Fig. 12 we have shown how a five bush button switch might be connected into the same code printer having only six lamps and giving the proper code for the added two intermediate exposures.

In this embodiment the switches marked NC'+, NC' and NC'— are directly connected in the respective circuits of the NC+ button lamp **91**, the NC' button lamp **91** and the NC'— button lamp **91**. The (NC'+) switch, which in this instance corresponds to the intermediate exposure which would have been made by closing both of switches NC+ and NC of the three button switch embodiment of Fig. 11, operates a double contact switch **130** which connects both the NC'+ button lamp **91** and the NC' button lamp into the circuit. Likewise the (NC'—) switch operates a double contact switch **131** which connects both the NC' button lamp and the NC'— button lamp into the circuit. In other words, with the five switch arrangement of Fig. 12, the same code will be printed by individually pushing buttons (NC'+) or (NC'—) as would be printed with pushing both the NC+ and NC buttons, or the NC— and NC buttons, respectively, of the three button switch arrangement of Fig. 11.

The operation of this printer may be briefly summarized as follows: With a negative in the printing gate, not shown, of the printer, the operator judges it for subject matter and depresses one of the push buttons N—, N or N+. If the depressed button happens to be the N— button, as shown in Fig. 6, this action also closes the switch NC— of the code printer circuit, see Fig. 6. Now when the switch **41** is actuated to initiate an exposure cycle, the oscillatable shaft **24** is rotated clockwise by a motor M. The cam **117** on shaft **24** actuates the snap switch **114** through its roller arm to supply line voltage to the primary **99** of the transformer housed in the switch housing. The secondary of the transformer thus provides a three volt potential to the lamps in the date compartments of the code printer and to the lamp controlled by the NC— switch to print the code corresponding to this compartment on the film. Power may be supplied at the same time through the manually operated switch **112** through push button **113** in order to provide the end-of-order code mark **84**. The primary exposure of the printing apparatus is started when switch **42** is actuated by arm **44** driven from the oscillatable shaft **24**. After the exposure is completed by the photoelectric control unit having shut off the printing lamp, the switch **41** is thrown in the opposite direction to cause the motor M to drive the shaft **24** through another 180° to reset the parts for the next printing operation. If more than one selector switch button is depressed to obtain an intermediate exposure, as is common practice, a combination of code marks will result. With the five button switch selector arrangement shown in Fig. 12, these intermediate exposures, or combinations of code marks, can be obtained by depressing a single button rather than a combination of two buttons as is necessary in the three button selector arrangement.

Although we have shown and described certain specific embodiments of our invention, we are aware that many modifications thereof are possible. Our invention, therefore, is not intended to be restricted to the precise details of construction shown and described, but is intended to cover all modifications coming within the scope of the appended claims.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent of the United States is:

1. In a photographic printing apparatus including a printing mask for supporting a sheet of sensitized paper in an exposure plane, means for exposing a sheet of paper in said exposure plane to light passing through a negative to produce a primary exposure on said paper; means for selectively varying the exposure to which the paper is submitted and including a plurality of push buttons which may be selectively depressed to alter the exposure; and means for starting said exposure including an oscillatable shaft; the combination of means for printing on said paper, along with the primary exposure, code data for identifying the type of exposure given said paper by reason of the push button depressed, and comprising a miniature multi-compartment code printer mounted directly beneath the printing mask adjacent the printing aperture therein, said code printer comprising a plurality of compartments corresponding in number to the number of said push buttons and the wall of each compartment facing said exposure plane capable of transmitting light; a code bearing transparency covering the light transmitting wall of each compartment and bearing identifying data corresponding to different primary exposures; a lamp in each of said compartments; each of said lamps connected in parallel circuit relation to a power supply circuit; a normally open switch in each of said lamp circuits; means for combining said lamp switches with said push buttons whereby depression of said push buttons will close the switch to the lamp of the code compartment corresponding thereto; a second normally open switch in the power supply circuit; and means actuated by said oscillatable shaft for closing said second switch when the shaft moves to start an exposure.

2. A photographic printing apparatus according to claim 1 in which the means actuated by said shaft for closing said second switch comprises a cam carried by said shaft adapted to engage and close said switch, and means for adjustably mounting said cam on said shaft whereby the time at which said switch is closed relative to the primary exposure can be varied.

3. A photographic printing apparatus according to claim 1 in which the means actuated by said shaft for closing said second switch comprises a cam carried by said shaft adapted during movement of said shaft in one of its directions to engage and close said switch, keep it closed for a given interval depending upon the configuration of the

cam, and allow the switch to reopen; means for adjustably mounting said cam on said shaft whereby the time at which it closes the switch relative to the starting of the primary exposure can be varied; and means for preventing said cam from closing said switch during return of said shaft to its starting position.

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