April 21, 1964 LE ROY H. SARGENT 3,129,634

PHOTOCOMPOSING MACHINE

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FIG. 1

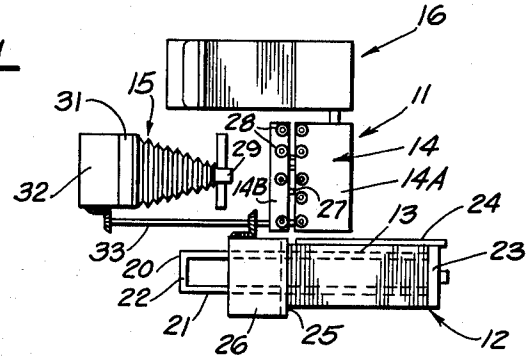


FIG. 2

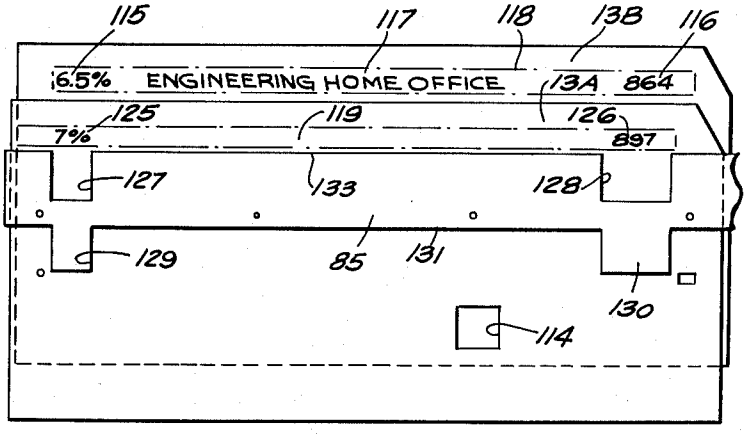
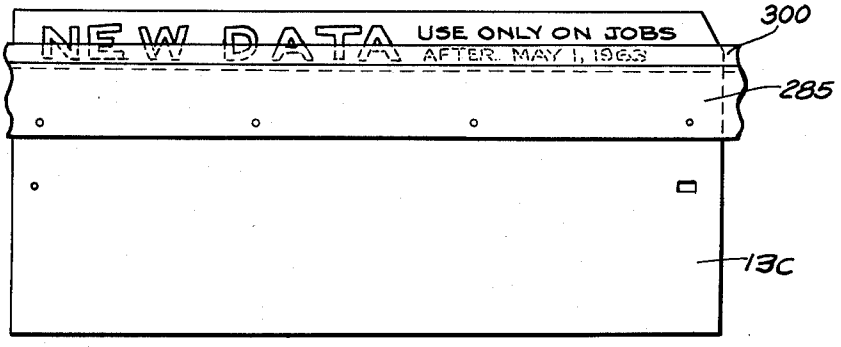


FIG. 3



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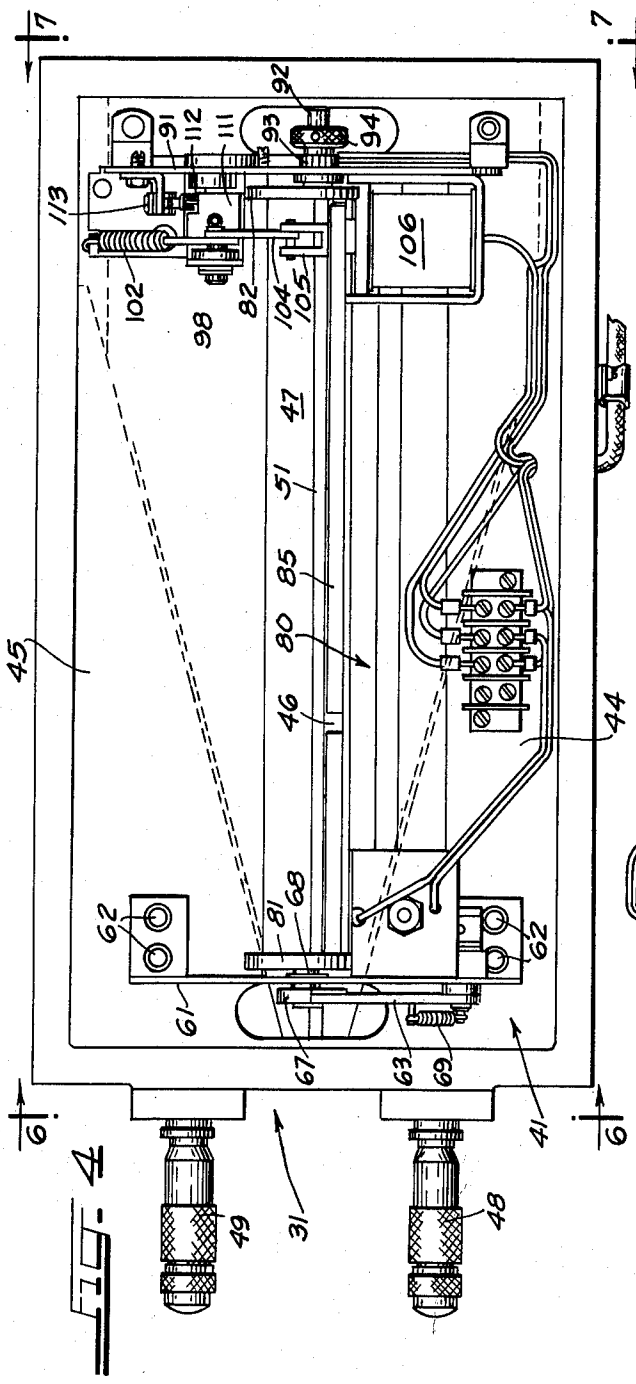


FIG. 4

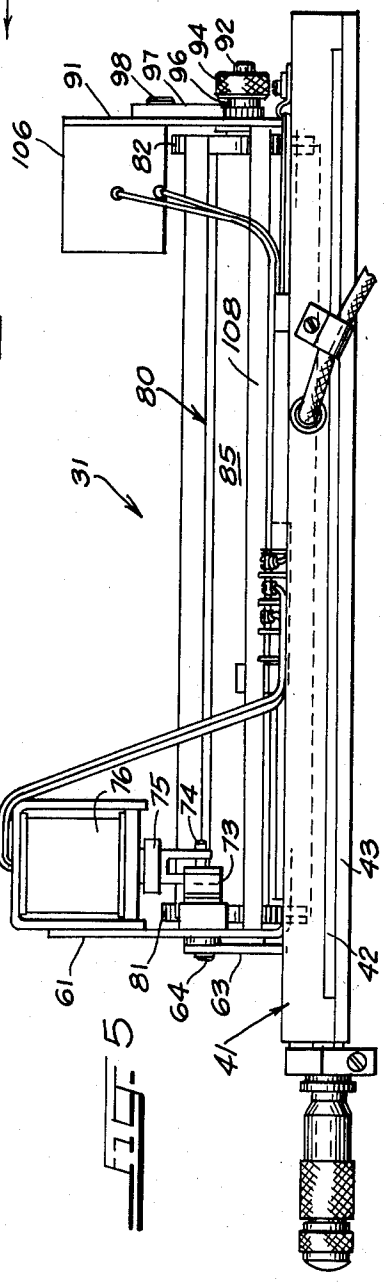


FIG. 5

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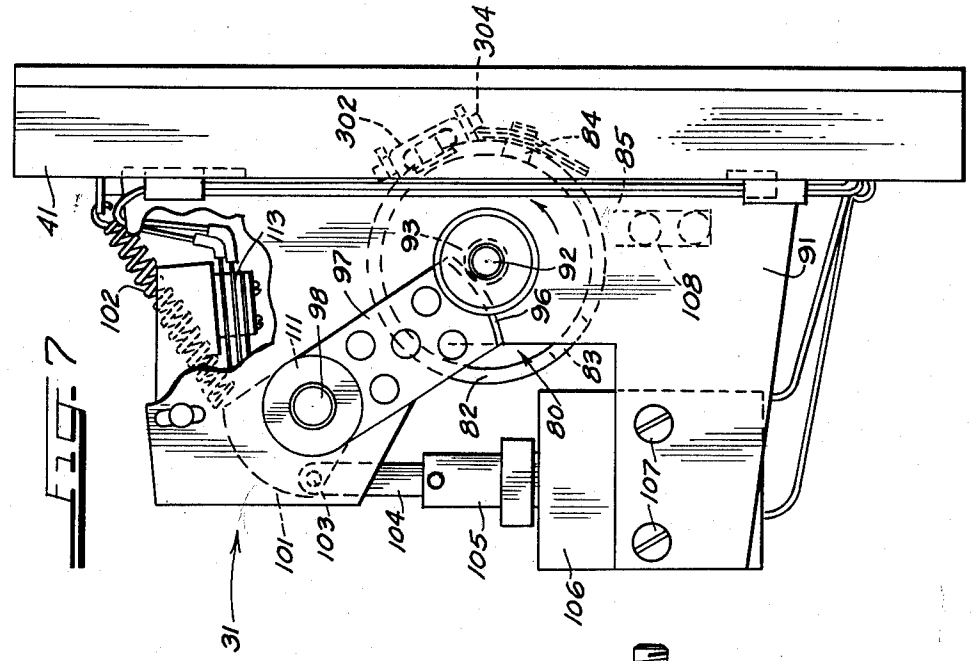


FIG. 7

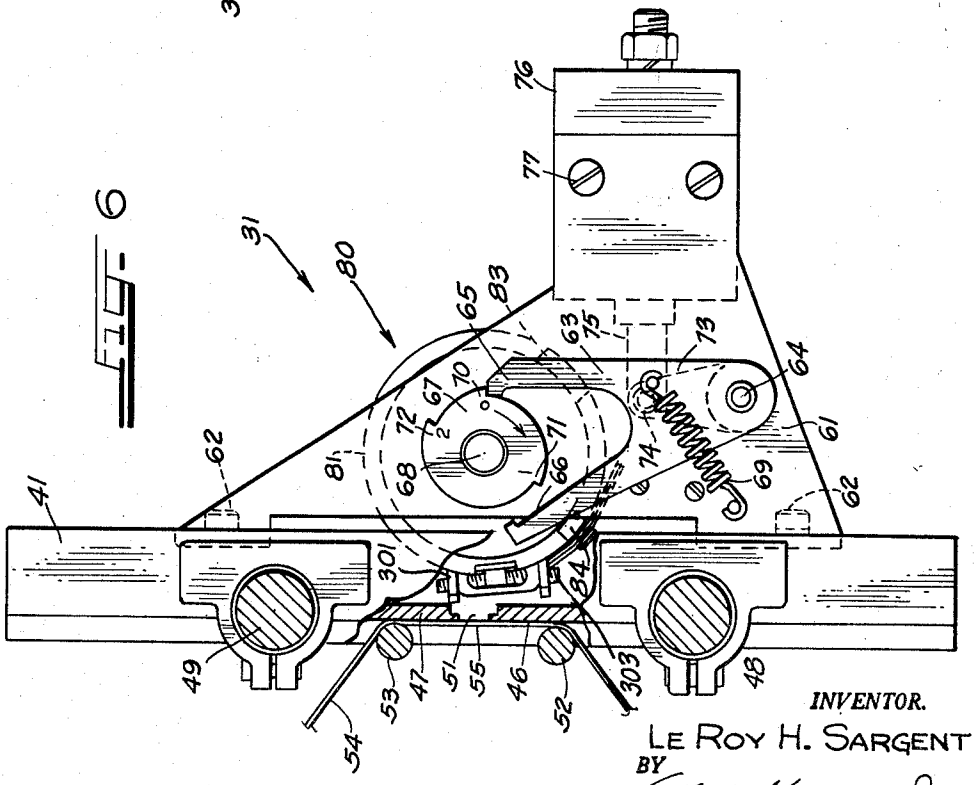


FIG. 6

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FIG. 8

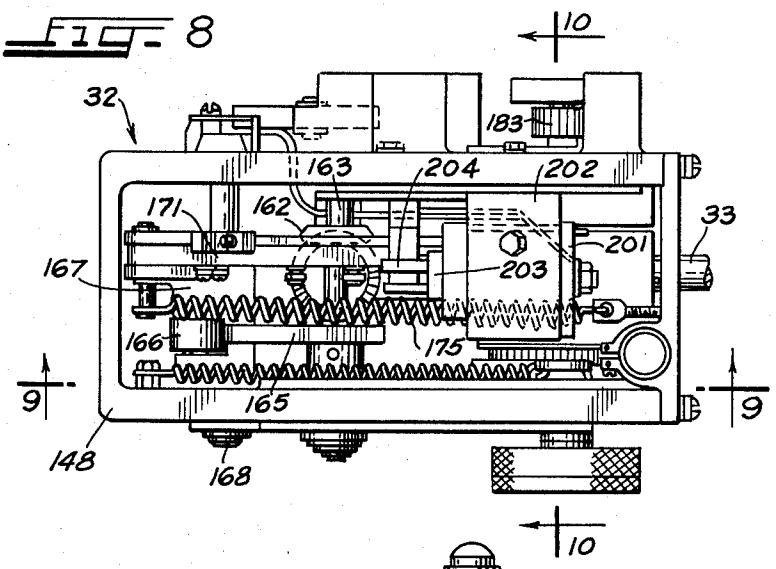
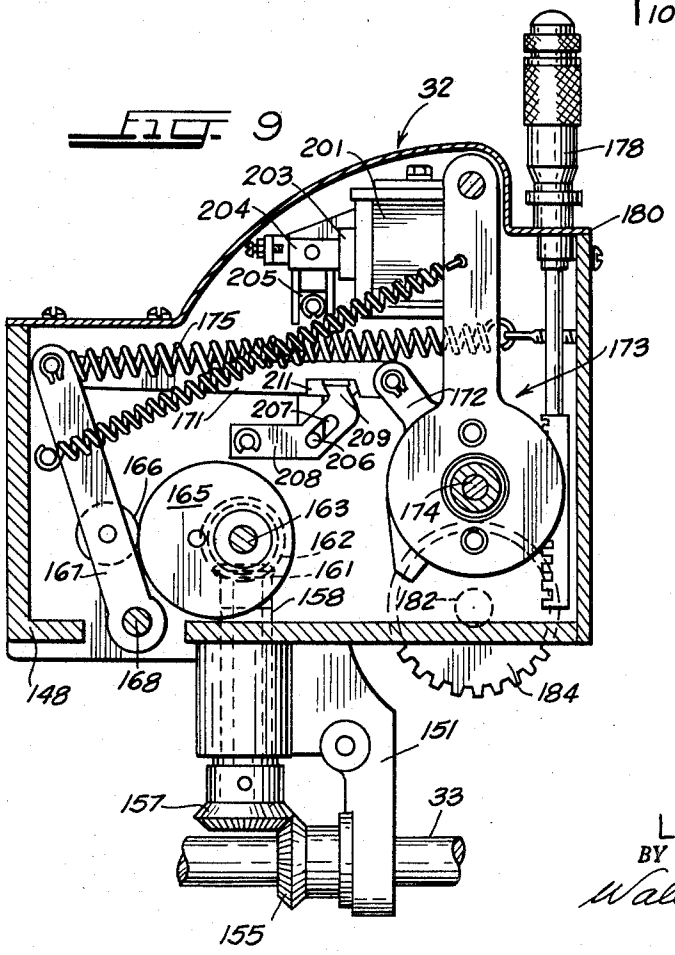


FIG. 9



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FIG. 10

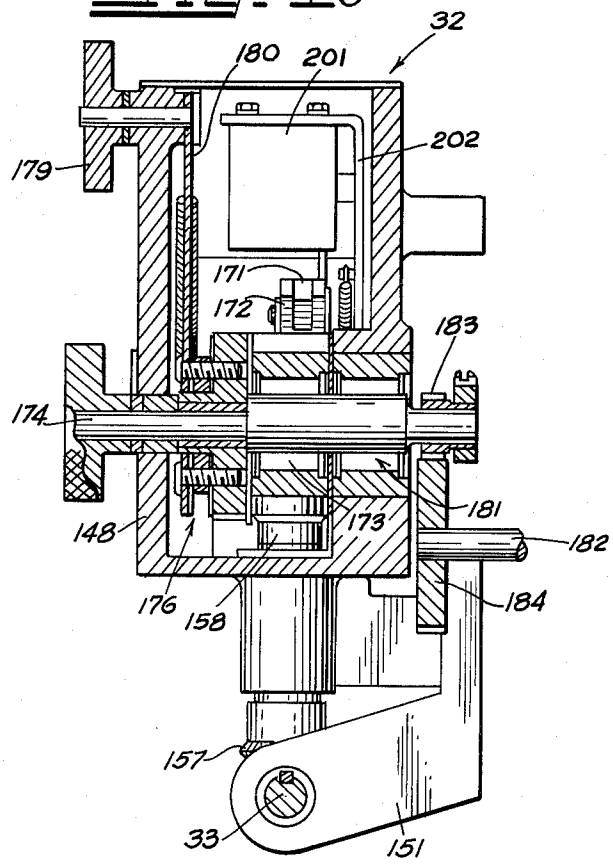
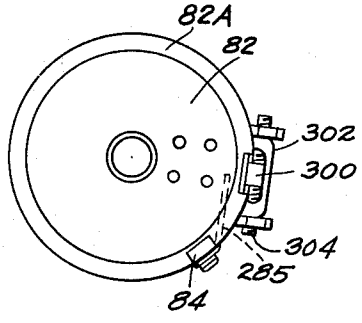


FIG. 12



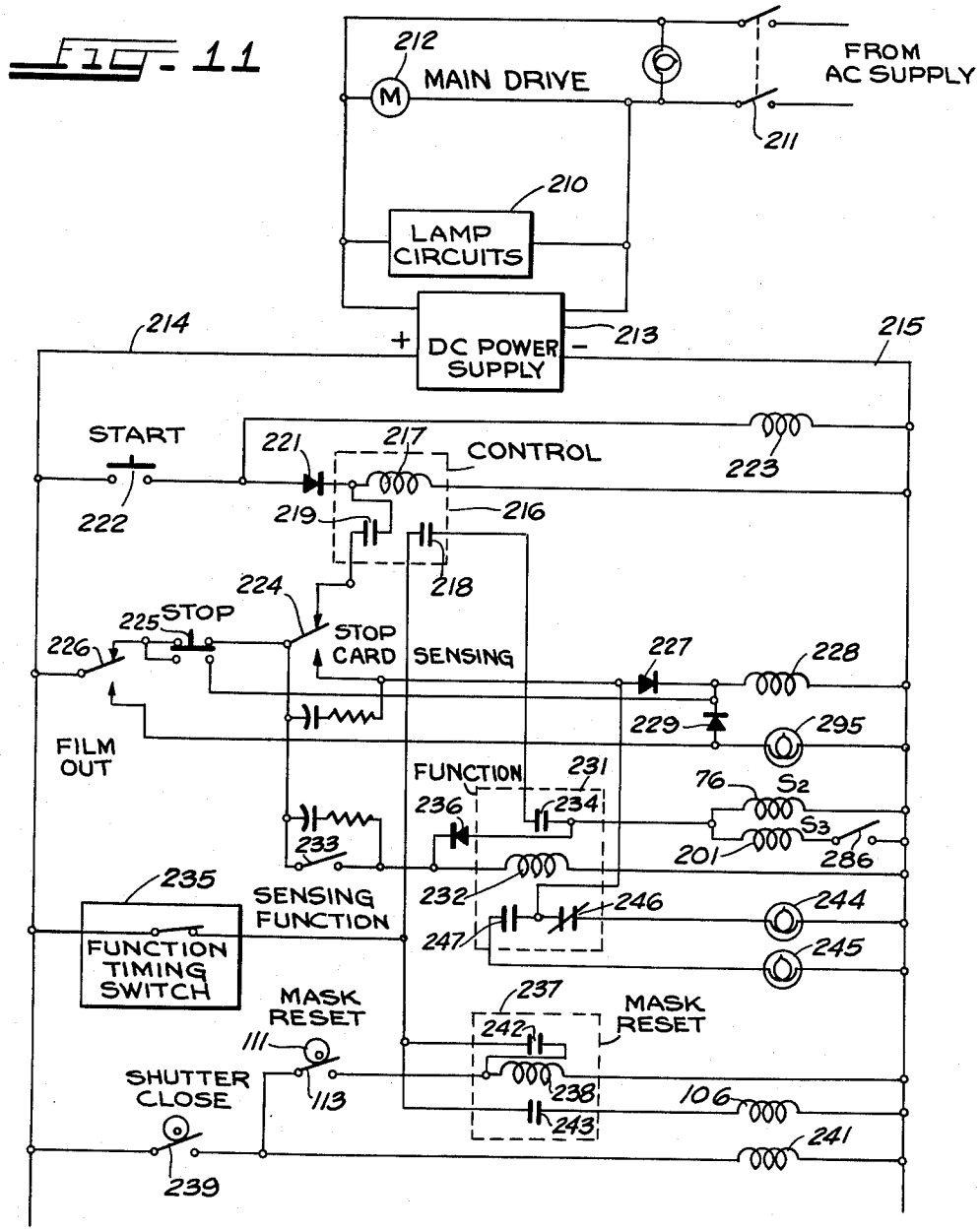
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Fig. 11



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United States Patent Office 3,129,634 Patented Apr. 21, 1964

3,129,634

PHOTOCOMPOSING MACHINE

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Filed July 5, 1962, Ser. No. 207,732
7 Claims. (Cl. 88—24)

This invention relates to a new and improved selective masking apparatus for a cyclically operable photocomposing machine of the kind in which data from individual business instruments are photographed in sequence to make up composite copy incorporating data from a plurality of such instruments.

The composing of printed matter by photographic processes affords substantial advantages, in many applications, in comparison with more conventional methods. One kind of photocomposing machine that is particularly advantageous in composing parts lists, directories, and similar matter is described and claimed in the co-pending application of Robert W. Davidson, Serial No. 806,719, filed April 15, 1959, now U.S. Patent No. 3,079,146, issued Feb. 26, 1963. In a photocomposing system utilizing a composing machine of this kind, the individual items for a directory, list, or the like are printed or otherwise applied to individual business instruments, usually conventional record cards. Typically, each card may carry one line of data. In the composing operation, the record cards are fed individually to an exposure station, are accurately aligned at that station, and are photographed sequentially upon a strip of film that is fed through the photographing camera in synchronism with the feeding of the business instruments into the exposure station of the machine.

In some applications, it may be necessary or desirable to modify the composed material as compared with the composition that would result from straightforward copying of the data from each card. For example, in a directory including substantial data with respect to a group of businesses and carrying a phone number as a part of each listing, it may be desirable to alter the phone listing for individual businesses. A similar example would be a price list, in which many items remain unchanged but in which selected prices must be altered. A further example would be a series of price lists including basically similar data identifying the items to be sold but with different price groupings to fit different classes of customers. In other instances, it may be necessary or desirable to reproduce a complete data item in preparing one form of list or directory and to omit entirely a part of the item in a related but different version of the same listing or directory.

It is a principal object of the present invention, therefore, to modify the arrangement of material reproduced in a photocomposing machine without sacrificing the quality or precision of the reproduction. A related object of the invention is to vary the content of the composition developed by a photocomposing machine of the kind described generally above without entailing a substantial revision or modification of the basic machine construction.

A further object of the invention is to effect changes in the composition produced by a photocomposing machine, from a series of related business instruments, in selected instances, without entailing the production of new business instruments reflecting the desired changes.

Another object of the invention is to provide for multipurpose use of individual data instruments, in a photocomposing machine, to fit a variety of applications.

A particular object of the invention is to provide a new and improved means for effecting modification of the composition produced by a photocomposing machine, either in a direction parallel to or normal to the direction in which film is fed through the photocomposing machine, by means of a single relatively simple and economical selective masking apparatus.

Another object of the invention is to provide automatic control of composition modifications, in the operation of a photocomposing machine, without stopping machine operation and without reducing the speed of operation of the machine.

Accordingly, the present invention relates to a selective masking apparatus for a cyclically operable photocomposing machine of the kind including means for sequentially positioning a series of data instruments, each bearing composing data in a given field, at an exposure station, camera means for photographing data on instruments located at the exposure station, and film advancing means for advancing a film through the camera in synchronism with movement of the instruments to the exposure station. Selective masking apparatus constructed in accordance with the invention comprises masking means actuatable between a normal condition and first and second auxiliary masking conditions. In the normal condition of the masking means, a given portion of the data field of the instrument located at the exposure station is exposed; this portion may be all or only a part of the data field. In the first and second masking conditions, on the other hand, different complementary portions of the data field are masked. The apparatus further includes selective control means for actuating the mask means to its first and second auxiliary masking conditions in successive cycles of operation of the photocomposing machine in order to modify the arrangement of data photographed on the film as compared with the arrangement obtained when the masking means is in its normal condition. Preferably, means are also provided for connecting the control means to the film advancing means in order to control film advance through the camera.

Other and further objects of the present invention will be apparent from the following description and claims and are illustrated in the accompanying drawings which, by way of illustration, show preferred embodiments of the present invention and the principles thereof and what is now considered to be the best mode contemplated for applying these principles. Other embodiments of the invention embodying the same or equivalent principles may be used and structural changes may be made as desired by those skilled in the art without departing from the present invention and the purview of the appended claims.

In the drawings:

FIG. 1 is a simplified plan view of a photocomposing machine, utilized to explain basic operation of the machine;

FIG. 2 illustrates the relationship between a principal masking member utilized in one embodiment of the present invention and the data instruments employed in the photocomposing machine;

FIG. 3 is similar to FIG. 2 but illustrates a different form of mask;

FIG. 4 is a front elevation view of the masking means of a selective masking apparatus constructed in accordance with a preferred embodiment of the present invention;

FIG. 5 is a bottom view of the masking mechanism of FIG. 4;

FIG. 6 is a left-hand elevation view of the masking mechanism of FIG. 4;

FIG. 7 is a right-hand elevation view of the masking mechanism;

FIG. 8 is a plan view of the film feed drive mechanism of the photocomposing machine, with the cover removed,

showing a part of the selective masking apparatus pertaining to film feed control;

FIG. 9 is an elevation view of the film feed drive taken approximately along line 9—9 in FIG. 8;

FIG. 10 is a sectional elevation view taken approximately along line 10—10 in FIG. 8;

FIG. 11 is a detail circuit diagram of the electrical operating circuit of the photocomposing machine; and

FIG. 12 is a detail illustration of the mask structure of FIG. 3.

In FIG. 1 there is illustrated a photocomposing machine 11 in which data from a series of individual business instruments, such as record cards or the like, are assembled and composed in the form of a negative which may subsequently be utilized in a printing process, as for example in a photolithographic printing application. The photocomposing machine 11 includes a card magazine 12 in which a relatively large number of individual record cards or other data instruments 13 may be stored. From the card magazine 12, the cards are fed individually to an exposure station 14. At the exposure station, each card is accurately aligned with respect to the lens system of a camera 15. The cards are photographed, in sequence, upon a strip of film fed through the camera 15 in synchronism with the feeding of the cards into aligned position in the exposure station 14. From the exposure station 14, the individual cards 13 are fed to a receiving hopper or stacking mechanism 16 in which they are reassembled in the same order as when they were first placed in the magazine 12.

In the photocomposing machine 11, the card storage and feed mechanism comprises a pair of elongated support bars or rails 20 and 21 that are connected together at one end by a cross rail 22. At the opposite end of the support rails 20 and 21 from the cross rail 22, there is mounted a backup plate 23 that is also secured to and supported by the two rails. The rails 20 and 21 extend parallel to a guide member 24. The data instruments 13 are supported on the rails 20 and 21 in vertical position. Means (not shown) are provided, connected to the cross rail 22, for urging the carriage comprising the members 20–23 to the left, as seen in FIG. 1, to bring the lead card in the stack of instruments 13 into engagement with the face plate 25 of a card feed mechanism 26.

A shuttle feed device is mounted in the face plate 25 of the card feed mechanism 26, and this shuttle is utilized cyclically to feed the lead card from the stack 13 into the slot 27 between the two portions 14A and 14B of the exposure station 14. The exposure station 14 includes means, not shown in detail, for interrupting the advancing movement of each card and for aligning the card precisely in a predetermined position in the exposure station. Feeding of the card into and out of the exposure station is completed by a conveyor mechanism illustrated only generally by the conveyor rollers 28.

The camera 15 is provided with a lens system 29 that extends outwardly of a masking apparatus 31. Behind the masking apparatus 31 there is located a film enclosure that includes a film feed mechanism 32 that is operated synchronously with the feeding of cards into the slot 27 in the exposure station 14. Thus, a main drive shaft 33 in the photocomposing machine 11 is utilized to drive the film feed mechanism 32, the card feed mechanism 26, and the conveyor and alignment apparatus at the exposure station 14.

FIGS. 4–7 illustrate a preferred construction for the masking device 31, which comprises one of the important elements of the selective masking apparatus of the present invention. As shown therein, the masking device 31 includes a frame 41, the frame 41 comprising an integral part of the camera 15. Frame 41 is substantially rectangular in configuration and is provided with a relatively large central opening. One face of the frame is provided with a recess 42 (FIG. 5) which is covered by a face plate 43 that also has a relatively large central opening. The face plate may be secured to the frame by any suitable means (not shown).

A pair of wedge members 44 and 45 are mounted in frame 41, being located in the recess 42 between the frame 41 and face plate 43. Wedge members 44 and 45 are maintained in engagement with a pair of adjustable fixed mask members 46 and 47, respectively. Each of the mask members is provided with an inclined surface that matches the inclined surface of the associated wedge member, the vertical spacing 51 between the mask members 46 and 47 being adjusted by horizontal movement of the wedge members as seen in FIG. 4.

A first micrometer 48 is mounted upon frame 41 with the shaft of the micrometer extending through the frame and into engagement with wedge member 44. A second similar micrometer 49 is mounted in frame 41 and extends therethrough into engagement with the other wedge member 45. The vertical position of mask member 46 may be adjusted upwardly by advancing micrometer 48 to drive wedge 44 to the right, as seen in FIG. 4, and the mask member can be lowered by retracting the micrometer to move the wedge to the left. Similarly, the micrometer 49 can be advanced to lower mask member 47 and may be retracted to raise the mask member. It is thus seen that accurate adjustment of the gap 51 between mask members 46 and 47 is readily achieved, and that the positions of the two mask members may be adjusted independently of each other.

As illustrated in FIG. 6, a pair of guide bars 52 and 53 are mounted upon mask frame 41, extending across the mask frame in closely spaced relation to mask members 46 and 47 respectively. A film strip 54 extends around and is guided by members 52 and 53, immediately behind the two mask members. Film strip 54, at its central portion 55, is located in the focal plane of the lens system of the camera. Thus, adjustable mask members 46 and 47 afford a focal plane mask for the camera of the photocomposing machine. This basic mask construction, as thus far described, is set forth in greater detail in the co-pending application of Robert W. Davidson, Serial No. 806,719, filed April 15, 1959 now U.S. Patent 3,079,146, issued Feb. 26, 1963.

Masking apparatus 31, in accordance with the present invention, includes selective masking means that cooperates with but is structurally independent of the adjustable fixed mask comprising mask members 46 and 47. The selective masking means comprises a first mounting bracket 61 affixed to a part of frame 41 by suitable mounting means such as the screws 62.

As shown in FIGS. 4–6, an escapement pawl member 63 is pivotally mounted upon a short shaft 64 that is journalled in a suitable bearing in bracket 61. Pawl member 63 is located on the outside surface of bracket 61. The pawl member is provided with two pawls 65 and 66 for engaging an escapement ratchet wheel 67 mounted upon a shaft 68 journalled in a suitable bearing in bracket 61. A spring 69 is connected from pawl member 63 to bracket 61 and biases the pawl member in a counterclockwise direction, as viewed in FIG. 6, normally maintaining pawl 65 in engagement with ratchet wheel 67. Ratchet wheel 67 is provided with three teeth or projections 70, 71 and 72 to establish three operating positions for the pawl as described more fully hereinafter.

Shaft 64 extends through bracket 61 and carries, at the opposite end, an operating lever 73. A connecting pin 74 is utilized to connect lever 73 to the armature 75 of an escapement control solenoid 76. Escapement control solenoid 76 is mounted by suitable means, such as the mounting screws 77, on an extension of bracket 61. Energization of solenoid 76 is effective to retract armature 75 and thereby pivot lever 73 in a clockwise direction, as seen in FIG. 6, in order to disengage escapement pawl 65 from ratchet wheel 67 and to engage pawl 66

with the ratchet wheel during a selective masking operation as described in detail hereinafter.

Escapement shaft **68** extends through bracket **61** and has affixed thereto, on the opposite side of the bracket, a mask support disc **81**. A similar disc **82** is located at the opposite side of assembly **31** (see FIGS. 4, 5 and 7), discs **81** and **82** being connected by a rigid one-piece member comprising an elongated bar section **83** formed integrally with two mask support rings **81A** and **82A** affixed to discs **81** and **82**, respectively, to form a mask rotor assembly **80**. An auxiliary mask member **85** is mounted upon a removable transverse bar **84**, its use being described in detail hereinafter.

A mounting bracket **91** is included in selective masking device **31**, being mounted upon frame **41** at the opposite side of the frame from bracket **61**. That is, bracket **91** is mounted upon the mask frame at the right-hand side thereof as seen in FIGS. 4 and 5. A drive shaft **92** is mounted in a suitable bearing supported in bracket **91**, and mask support disc **82** is affixed to and carried by shaft **92**. A pinion gear **93** is affixed to shaft **92**, on the outboard portion thereof, and a knurled manual rotating knob **94** is also affixed to the shaft.

Pinion gear **93** is engaged by a gear segment **96** mounted on the end of a lever **97** that is affixed to a shaft **98**. Shaft **98** is mounted in a suitable bearing supported in bracket **91** and extends through the bracket. A lever **101** is affixed to shaft **98** at the end thereof opposite lever **97**. A spring **102** is connected from lever **101** to the frame and biases lever **101** in a clockwise direction as viewed in FIG. 7. That is, spring **102** biases lever **101**, shaft **98**, and lever **97** toward the position shown in FIG. 7. Lever **101** is also connected, by a suitable connecting pin **103** and a connecting member **104**, to the armature **105** of a reset solenoid **106**. Reset solenoid **106** is mounted upon bracket **91** by suitable means such as the screws **107**. When energized, solenoid **106** is effective to retract its armature **105**, pulling pin **103** downwardly and rotating members **101**, **98**, and **97** in a counterclockwise direction as viewed in FIG. 7.

Additional means may be provided for maintaining brackets **61** and **91** in accurate alignment with each other to assure effective operation of the selective masking apparatus. To this end, a transverse fixed tie bar **108**, or other suitable means, may be employed.

Shaft **98** also carries a reset cam **111** that is engaged by a cam follower roller **112**. Roller **112** is utilized to actuate a reset switch **113** that is mounted upon bracket **91** as best shown in FIGS. 4 and 7. Reset switch **113** is employed to determine the completion of selective masking operation and is utilized to actuate the reset mechanism.

The configuration of selective mask **85** and its relation to data to be reproduced from the individual business instruments **13** can best be understood by reference to FIG. 2. FIG. 2 shows the mask in alignment with a first data card **13A**, sometimes referred to hereinafter as a function or control card. Immediately behind card **13A**, in FIG. 2, there is shown a second data card **13B** which is not a function card. Card **13A** has a control marking or aperture **114**, but card **13B** does not carry such control indicia. The relationship between cards **13A** and **13B** is such that a part of the data from the function card **13A** is to be substituted for pre-existing data on the original data card **13B**. Thus, data card **13B** carries two numerical data items **115** and **116** and a legend **117**, all located in a data field **118**. In a given photocomposing operation, however, it may be desired to retain the legend **117** but to substitute the numerical data items **125** and **126** from the data field **119** of card **13A** for items **115** and **116**, respectively, from the basic data instrument.

Mask **85**, as shown in FIG. 2, is provided with apertures **127** and **128**, in its upper edge, that are aligned with data items **125** and **126** on the function card **13A**. The lower or trailing edge of mask **85**, on the other hand, is provided with a pair of projecting mask elements **129** and **130** separated by an aperture or gap **131**. The projections **129** and **130** are directly aligned with apertures **127** and **128**, and accordingly, are aligned with the left- and right-hand numerical data items on the two record cards **13A** and **13B**. The mask is shown in its normal position relative to the data field **119** of function card **13A**, this position corresponding to position **70** of the mask escapement ratchet wheel **67**, FIG. 6, with the card **13A** aligned in exposure position at the exposure station **14** of the machine (FIG. 1).

It is now possible to consider the basic mode of operation of the selective mask mechanism **31** of FIGS. 4–7, taken in conjunction with the explanatory illustration of FIG. 2 and the photocomposing apparatus shown in FIG. 1. In a photocomposing operation in which numerical data from card **13A** are to be substituted for the corresponding numerical data on card **13B**, the function card **13A** is inserted in the stack of cards **13** immediately ahead of card **13B**. Photocomposing machine **10** is then placed in operation. As long as no function card is advanced to the exposure station **14**, the only limitation upon exposure is that provided by the fixed adjustable mask comprising mask members **46** and **47**. The gap **51** between the two adjustable mask members permits exposure of the complete data field on each card, as exemplified by the data field **118** of card **13B**. The auxiliary selector mask **85** remains in its normal position as shown in each of FIGS. 2 and 4 through 7 and does not mask any portion of the data fields of the cards at the time of exposure.

When control card **13A** is fed to the exposure station **14** of the machine, the presence of the control or function aperture **114** is detected by a suitable sensing switch, photocell, or other device (see switch **233**, FIG. 11). When this occurs, an energizing circuit is established for control solenoid **76**, retracting the solenoid armature **75** and pivoting pawl member **63** in a clockwise direction as seen in FIG. 6. The pivotal movement of the pawl member releases pawl **65** from engagement with ratchet projection **70**. This releases shaft **68** and rotor assembly **80** for rotation in a clockwise direction, as viewed in FIG. 6, this being counterclockwise rotation in the view of FIG. 7. Rotation of the mask rotor assembly is effected by the biasing force supplied by the spring **102**, acting through lever **97** and gears **96** and **93** (FIG. 7). Movement of the rotor **80** elevates mask **85** from the normal position shown in FIG. 6 to a first masking position as shown in FIG. 7. As a result, the central portion **133** of mask **85** is effective to mask the central portion of the data field **119** on function card **13A** (FIG. 2). Thus, in this cycle of operation the data photographed by the camera **15** is restricted to the two data items **125** and **126** from card **13A** and the intervening portion of the data field remains unexposed on the film.

After control card **13A** has been photographed, it is fed from the exposure station **14** to the card stacker **16**, and the next card, related data card **13B**, is transferred to the exposure station of the machine. In this cycle of operation, advancement of film **54** (FIG. 6) by the apparatus **32** (FIG. 1) is prevented by a suitable control apparatus described hereinafter. Thus, the same film area upon which data items **125** and **126** (FIG. 2) have been photographed remains in alignment with the gap **51** in the focal plane mask. As control card **13A** leaves the exposure station, however, the energizing circuit for solenoid **76** is broken. This releases pawl **66** from engagement with ratchet tooth **71**, due to the action of spring **69**, which pivots pawl member **63** in a counterclockwise direction and brings pawl **65** into position to engage ratchet tooth **72**. Consequently, the selective mask assembly rotates further in a clockwise direction as seen in FIG. 6, this being couterclockwise direction in FIG. 7, again elevating selector mask **85**.

The upward movement of mask **85** to its third operating position brings the mask projections **129** and **130** into

masking relation to data items 115 and 116 of card 13B when the latter is aligned at the exposure station of the photocomposing machine. Consequently, when card 13B is photographed, only the legend 117 is photographed, since this is exposed through the aperture 131 between mask elements 129 and 130 (FIG. 2). As a result, the line of data produced on the film 54 by photographing both of cards 13A and 13B is a composite comprising the data items 117, 125 and 126, items 115 and 116 being omitted.

Rotation of mask 85 to its third operating position (second masking position) as described above, results in closing of reset switch 113. When card 13B has been photographed and is advanced to the card stacker, a timing switch operates in conjunction with switch 113, as described more fully hereinafter, to energize reset solenoid 106. Energization of the reset solenoid 106 is effective to retract its armature 105, pulling lever 101 downwardly and rotating shaft 98 in a counterclockwise direction. This results in a corresponding counterclockwise movement of lever 97 with the result that the gear 96 drives pinion 93 and rotates shaft 92 in a clockwise direction. The entire mask assembly is thereby rotated back to the original position illustrated in FIG. 6, with mask 85 disposed below and out of the way of the exposure aperture 51. Thus, the selective masking apparatus is reset for normal operations and maintains auxiliary mask 85 clear of the exposure aperture until the next selective operational cycle initiated by positioning of another function card, similar to control card 13A, at the exposure station of the machine.

The film feed mechanism 32 for the photocomposing machine, illustrated in FIGS. 8–10, comprises a main frame or housing 148. A bracket 151 which is a part of the base of frame 148 serves as a bearing bracket for the film feed drive shaft 33. Shaft 33 is coupled, through two bevel gears 155 and 157, to a vertical shaft 158 that carries, at its upper end, a further bevel gear 161. Gear 161 drives a meshing bevel gear 162 mounted on a cam shaft 163 upon which an eccentric cam 165 is mounted.

Eccentric 165 is engaged by a cam follower 166 mounted on a lever 167 that is pivoted on a stationary shaft 168. A spring 175 biases lever 167 in a clockwise direction, maintaining follower 166 engaged with eccentric 165. The free end of lever 167 is pivotally connected to a link 171 in turn connected to a crank 172.

Crank 172 is the driven element of a sprag-type clutch 173. Clutch 173, which is of conventional construction, is effective to rotate the central shaft 174 of the clutch assembly in a counterclockwise direction (FIG. 9) when crank 172 is driven counterclockwise, but disengages automatically so that the crank can make a return (clockwise) movement without a corresponding movement of shaft 174.

Adjustment of the angular displacement through which shaft 174 is driven during each cycle of operation is provided by a precision adjustment device 176 that may be adjusted by means of a micrometer 178. A locking lever 180 and locking knob 179 are also incorporated in adjustment device 176 to maintain a given setting for the film feed.

The film feed mechanism 32, as thus far described, is essentially similar to that described in the aforementioned application of Robert W. Davidson; accordingly, only a brief description of its operation is included herein. In FIG. 9, the mechanism is shown in the position corresponding to the end of a film feed cycle. In each machine cycle, shaft 163 is rotated, permitting follower 166 and lever 167 to move to the right in response to spring 175. This drives link 171 to the right, moving clutch member 172 clockwise. But shaft 174 does not rotate, during this movement of clutch member 172, as noted above. A second sprag clutch 181 (FIG. 10) can be used to make sure that shaft 174 remains stationary and is not rotated clockwise.

Subsequently, near the end of each machine cycle, eccentric 165 drives follower 166 back toward its original position. As a result, shaft 174 is rotated counterclockwise through the linkage comprising lever 167, link 171, and clutch 173. This rotational movement of shaft 174, coupled to a film feed shaft 182 through the gears 183 and 184 (FIG. 10), advances film through the camera a predetermined distance determined by the setting of adjustment device 176.

Film feed mechanism 32, in the present instance, further includes a stop film advance solenoid 201 mounted on a bracket 202 within housing 148. The armature 203 of the solenoid is connected by a yoke 204 to a depending pivotally mounted lever 205. Link 205 carries a pin 206 engaged in a slot 207 in a latching lever 208 that is pivotally mounted on bracket 202. Lever 208 includes a latch element 209 aligned with a latch receptacle or depression 211 in the film feed drive link 171.

The stop-film-advance linkage 204—209 is shown in its stop position with solenoid 201 energized. Ordinarily, when no function card has been sensed, the solenoid is de-energized and armature 203 is located outwardly of the solenoid, to the left of the position shown in FIG. 9. Under these conditions, the consequent movement of pin 206 to the right drives lever 208 clockwise from the illustrated position, with latch element 209 clear of link 171. Consequently, normal operation of the film feed is not interrupted by the stop linkage.

When the film is to be held stationary for a dual exposure cycle, as described, solenoid 201 is energized simultaneously with energization of mask advance solenoid 76. This drives the linkage 204–209 to the position illustrated, with latch element 209 engaged in slot 211. Consequently, the drive link 171 cannot move through its normal film feed motion. As long as solenoid 201 is energized, therefore, no film advance occurs in the machine.

FIG. 11 illustrates, in simplified form, the operating circuit for the photocomposing machine, elements not necessary to explanation of the present invention having been omitted. As shown therein, a main line switch 211 connects the main drive motor 212 to a suitable A.C. power supply. The lamp circuits 210 are also connected to the A.C. power supply through switch 211, as is a D.C. power supply circuit 213 having positive and negative buses 214 and 215.

The operating circuit of FIG. 11 includes a main control relay 216 having an operating coil 217 and two sets of normally open contacts 218 and 219. One terminal of coil 217 is connected, through a diode 221 and a start switch 222, to positive bus 214. The other terminal of the coil is returned to the negative bus. A start solenoid 223, used to actuate the principal cyclic drive of the machine, is also connected across the D.C. busses in series with switch 222.

Relay contacts 219 are connected in a holding circuit for relay 216, this circuit starting from the positive side of coil 217 and extending through a single-pole double-throw stop card sensing switch 224, a manual stop switch 225, and a film out sensing switch 226 to the positive bus 214. Switches 225 and 226 are also single-pole double-throw devices.

The second pole of stop card sensing switch 226 is connected through a diode 227 to a machine stop solenoid 228. A parallel connection is made from the second pole of stop switch 225 to the stop solenoid, the solenoid being returned directly to the negative bus. Yet a third parallel connection is made from film out switch 226, through a diode 229, to the stop solenoid.

The control circuit includes a function relay 231 having an operating coil 232 connected to the positive bus through a function sensing switch 233 and through the normally closed poles of switches 225 and 224. It is sensing switch 233 that is employed, in the present instance, to sense the occurrence of a record card function

aperture (such as aperture **114** in card 13A, FIG. 2). Coil **232** is returned directly to the negative bus.

Mask advance solenoid **76** and film feed stop solenoid **201** are connected in parallel with each other in a circuit starting at negative bus **215** and extending through a pair of normally open contacts **234** in function relay **231** to contacts **218** of main control relay **216**. From contacts **218**, this circuit continues through a cam-actuated function timing switch **235** to the positive bus. Switch **235** is shown closed, but is opened in each machine cycle. Contacts **234** also afford a holding circuit, through a diode **236**, for the operating coil of the function relay.

A mask reset relay **237** is incorporated in the control circuit. One terminal of the operating coil **238** of relay **237** is connected through mask reset switch **113** (FIG. 7) and a shutter close switch **239** to positive bus **214**, the other terminal of coil **238** being returned to negative bus **215**. Switch **239** is a cam-actuated switch that is operated during each machine cycle to energize a shutter-close solenoid **241** that controls the camera shutter.

Mask reset relay **238** includes two pairs of normally open contacts **242** and **243**. Contacts **242** are connected in a holding circuit that extends from coil **238** to function timing switch **235** and from the timing switch to the positive bus. Contacts **243**, on the other hand, are connected between timing switch **235** and the mask reset solenoid **106** (FIG. 7) that restores the selective masking apparatus to its original condition once a masking operation has been completed, as described hereinabove.

In the circuit illustrated in FIG. 11, two indicator lights **244** and **245** are utilized to inform the operator of the operating condition of the machine. Lamp **244** is connected in an operating circuit that begins at negative bus **215** and extends through a pair of normally closed contacts **246** in function relay **231** back to the second pole of stop card sensing switch **224**. Lamp **245** is connected in a similar circuit that includes a pair of normally open contacts **247** in the function relay instead of normally closed contacts **246**.

When the photocomposing machine is placed in operation, switch **211** is first closed, energizing the main drive motor **212** and the lamp circuits **210**. Closing of switch **211** also energizes the D.C. power supply **213**. This conditions the photocomposing machine for operation, but operation is actually started by closing start switch **222** momentarily to energize solenoid **223**.

Closing of start switch **222** also energizes the operating coil **217** of control relay **216**. When the relay is actuated, contacts **219** close and establish a holding circuit for the relay through switches **224**, **225** and **226**, all of which are normally maintained in the positions shown in FIG. 11. Contacts **218** of the control relay are also closed to establish circuit conditions that control operation of the selective masking apparatus.

As long as the photocomposing machine continues in normal operation, and the cards fed to the exposure station of the machine do not call for a masking function, function relay **231** and mask reset relay **237** remain unactuated. When a function card such as card **13A** (FIG. 2) is fed to the exposure station, however, function sensing switch **233** is closed. Closing of switch **233** establishes an operating circuit for coil **232** of function relay **231**, this circuit extending from the positive bus through switches **226** and **225** to the function sensing switch and from the switch to coil **232** and directly to the negative bus. As soon as the function relay is energized, contacts **234** and **247** close and contacts **246** open. Closing of contacts **234** completes an operating circuit for mask control solenoid **76** and for film feed stop solenoid **201**, this circuit extending through function relay contacts **234** and control relay contacts **218** and the function timing switch **235**, which is closed in this portion of the machine cycle. By energizing solenoid **76**, the selective masking apparatus is actuated as described hereinabove; at the same time, a one-cycle interruption in film feed advance is provided because solenoid **201** is held energized long enough to prevent the normal film feed operation. Closing of contacts **234** is also effective to maintain function relay **231** energized beyond the time that sensing switch **233** is opened as the function card is fed out of the exposure station.

In each operating cycle, function timing switch **235** is opened momentarily. Consequently, at the end of the cycle in which function relay **231** is actuated, or early in the next cycle, the timing switch opens, de-energizing the relay. Accordingly, solenoids **76** and **201** are de-energized, conditioning the photocomposing machine for the second cycle in the selective composing operation described in detail above. In the next operation the function relay is not energized again, since the second card **13B** does not include a function aperture **114** (see FIG. 2) and sensing switch **233** consequently does not close.

In the second cycle of selective composing operation, mask reset switch **113** is closed (see FIG. 7). Closing of the mask reset switch does not immediately energize mask reset relay **237**. However, when the cam-actuated shutter close switch **239** is closed, the relay is energized. Actuation of the relay closes contacts **242** and **243**, the contacts **242** establishing a holding circuit for the relay through function timing switch **235**. This action takes place near the end of the cycle, and the closing of contacts **243** energizes mask reset solenoid **106** to restore the selective masking apparatus to its original operating condition. Subsequently, the mask reset relay is again de-energized when the function timing switch opens in its normal cyclic operation.

The photocomposing machine can be interrupted in its operation in a number of ways. Thus, a card aperture at a different location than function aperture **114** can be utilized to actuate the stop sensing switch **224** and thereby energize stop solenoid **228**. A similar effect can be achieved by actuating stop switch **225**. Finally, switch **226** may be actuated upon feeding of the end of the film from the film magazine to the camera. In each instance, the holding circuit for control relay **216** is opened, so that initiation of machine operation can only occur by again closing start switch **222**. Indicator lights **244** and **245** give the machine operator a direct indication of the basis for interruption of machine operation; a further indicator lamp **295** shows when the film supply is exhausted.

The selective masking apparatus of the present invention can also be utilized for a substantially different selection operation entailing selective composition of large headings or two-line data entries, with only minor modifications. For this purpose, mask **85** is removed from carrier bar **84** and is replaced by a simple mask member **285** (see FIGS. 3 and 12). In addition, an interchangeable mask bar **300** is mounted on rotor assembly **80** in partial overlapping relation to mask member **285**.

Mask bar **300** is supported between a pair of brackets **301** and **302** that are mounted upon support discs **81** and **82** respectively. Bracket **301** has an adjusting screw **303** mounted therein and a corresponding adjusting screw **304** is mounted in bracket **302**. To mount bar **300** in operative position, the adjusting screws **303** and **304** may be backed off slightly so that the mask bar may be mounted in position as shown in the drawings, after which the adjusting screws may be tightened to hold the bar in the desired position.

As noted above, bar **300** overlaps mask **285** slightly. The combination of mask member **285** and bar **300** is constructed with such dimensions that these two mask elements together cover one-half of a two-line opening between the adjustable fixed mask members **46** and **47** of the photocomposing machine (FIG. 4). The arrangement is such that the upper edge of mask bar **300**, in the normal position of use, serves as the lower edge of the main mask opening **51**, the lower adjustable fixed mask

46 being displaced downwardly by a distance sufficient to leave a two-line gap between members 46 and 47.

In this embodiment of the invention, the only other significant change in the apparatus is to disconnect the film advance stop solenoid 201. This may be readily accomplished by incorporating a switch 286 in the operating circuit of solenoid 201; however, it should be noted that switch 286 does not affect the operating circuit for mask control solenoid 76.

With the minor changes set forth hereinabove, the system is now conditioned for selective reproduction of two-line or large heading data. In normal operation, mask 285 and bar 300 remains in the position illustrated in FIG. 3, the upper edge of bar 300 limiting aperture 51 so that only single-line data is reproduced by the photocomposing machine. Where a card bearing a large heading or two lines of data is to be used, a blank function card is positioned ahead of the two-line card. The blank function card is a plain card having a function aperture such as the function aperture 114 (FIG. 2) but does not carry any data to be reproduced. This card is followed by a large heading or two-line card such as the card 13C of FIG. 3.

When the blank function card enters the exposure station of the machine, the function aperture 114 in this card is sensed by function sensing switch 233 (FIG. 11) closing the switch. Closing of switch 233 is effective to actuate function relay 231 and to energize mask control solenoid 76 as described above. Consequently, mask 285 and bar 300 are rotated to the second operating position for the mask assembly, in which they conjointly block the exposure aperture 51 of the fixed adjustable mask completely (see FIGS. 4 and 7). Accordingly, the film is not exposed in this cycle of machine operation. However, and unlike the operation described above, the film is advanced, since the operating circuit for solenoid 201 is now opened at switch 286.

The next card reaching the exposure position is the two-line or large heading card 13C. In the cycle of operation in which this card is positioned in the exposure station, rotor assembly 80 is rotated, as described above, to the third operating position of the selective masking apparatus. In this position, mask 285 and bar 300 are entirely clear of the main mask aperture 51, exposing a two-line width on the film. Following photographing of data from card 13C, the selective masking apparatus is again restored to its normal condition by the reset mechanism described hereinbefore, and the photocomposing operation proceeds on a single-line basis until the next function card is sensed at the exposure station. Bar 300 is made readily replaceable in rotor assembly 80 to permit use of several bars of varying width and thus enable convenient use of this embodiment of the invention with varying type sizes.

Hence, while preferred embodiments of the invention have been described and illustrated, it is to be understood that they are capable of variation and modification, and I therefore do not wish to be limited to the precise details set forth, but desire to avail myself of such changes and alterations as fall within the purview of the following claims.

I claim:

1. A selective masking apparatus for a cyclically operable photocomposing machine comprising means for sequentially positioning a series of data instruments bearing exposure data in a given field, at an exposure station, at least some of said instruments carrying control indicia, and camera means for photographing the data from said instruments, said selective masking apparatus comprising:

an adjustable fixed mask positioned in the focal plane of said camera means;

an auxiliary mask positioned immediately adjacent said focal plane mask and movable between first, second, and third positions in which different portions of the data fields on instruments positioned at said exposure station are exposed through the combination of said masks;

sensing means for sensing the control indicia on said instruments;

and selective control means, connected to said sensing means, for actuating said auxiliary mask to said second and third positions in successive machine cycles in response to sensing of said control indicia to modify the arrangement of data photographed by said camera means relative to that obtained when said auxiliary mask is maintained in its first position.

2. A selective masking apparatus for a cyclically operable photocomposing machine comprising means for sequentially positioning a series of data instruments each having an elongated data field for exposure data, at an exposure station, at least some of said instruments carrying control indicia, and camera means for photographing the data from said instruments, said selective masking apparatus comprising:

an adjustable fixed mask positioned in the focal plane of said camera means, outlining said data field in said focal plane;

an auxiliary mask positioned immediately adjacent said focal plane mask and rotatably movable between normal, second, and third positions in which different portions of the data fields on instruments positioned at said exposure station are exposed through the combination of said masks;

sensing means for sensing the control indicia on said instruments;

and selective control means, connected to said sensing means, for rotating said auxiliary mask to said second and third positions and back to said normal position in successive machine cycles, in response to sensing of said control indicia, to modify the arrangement of data photographed by said camera means relative to that obtained when said auxiliary mask is maintained in its normal position by masking off at least a portion of the data field of at least one instrument.

3. A selective masking apparatus for a cyclically operable photocomposing machine comprising means for sequentially positioning a series of data instruments, each bearing exposure data in a given field, at an exposure station, camera means for photographing data on instruments located at said exposure station, and film advancing means for advancing a film through said camera means in synchronism with movement of said instruments to said exposure station, said selective masking apparatus comprising:

masking means actuatable between a normal condition, in which a given portion of the data field of the data instrument at said exposure station is exposed, and first and second auxiliary masking conditions in which different complementary portions of the data field are masked;

selective control means for actuating said mask means to said first and second auxiliary masking conditions, in successive cycles of operation of said photocomposing machine, to modify the arrangement of data photographed on said film relative to that obtained with said masking means in its normal condition;

and means for connecting said control means to said film advancing means to control film advance through said camera means.

4. Selective masking apparatus for a cyclically operable photocomposing machine comprising means for positioning a series of data instruments, each bearing composing data in a given field, at an exposure station, at least some of said instruments bearing control indicia, a camera for photographing the data on instruments located at said exposure station, and film advancing means for advancing a film through said camera in synchronism with move-

ment of said instruments to said exposure station, said selective masking apparatus comprising:

mask means actuatable between a normal position in which the data field of the instrument at said exposure station is fully exposed and first and second masking positions in which complementary portions of the data field are masked;

sensing means for sensing control indicia on said instruments;

selective control means, response to said sensing means, for actuating said mask means to said first and second masking positions in successive cycles of said photocomposing machine to modify the arrangement of data photographed on said film relative to that obtained with said mask means in its normal position by interposing data from one instrument with data from another;

and means connecting said sensing means to said film advancing means to prevent film advance in any machine cycle in which said mask means is in said first masking position.

5. Selective masking apparatus for a cyclically operable photocomposing machine comprising means for positioning a series of data instruments, at an exposure station, each of said instruments bearing composing data in a given elongated linear field and only selected ones bearing predetermined control indicia, a camera for photographing the data on data instruments located at said exposure station, and film advancing means for advancing a film through said camera in synchronism with movement of said instruments to said exposure station, said selective masking apparatus comprising:

a mask movable between a normal position in which the data field of the instrument at said exposure station is fully exposed and first and second auxiliary masking positions in which complementary longitudinal portions of the data field are masked;

sensing means for sensing the control indicia on said instruments;

selective control means, connected to said sensing means, for moving said mask to said first and second masking positions in succeeding cycles of said photocomposing machine, in response to the sensing of predeterminated control indicia on one instrument and for restoring said mask to its normal position after photographing of data from the next succeeding instrument;

and means connecting said sensing means to said film advancing means to prevent film advance in the machine cycle in which said mask is in its first auxiliary masking position.

6. A selective masking apparatus for a cyclically operable photocomposing machine comprising means for sequentially positioning a series of data instruments, some bearing exposure data in a given field and others carrying control indicia, at an exposure station, and camera means for photographing the data from said instruments, said selective masking apparatus comprising:

an adjustable fixed mask positioned in the focal plane of said camera means and having an aperture equal to said data field;

an auxiliary mask positioned immediately adjacent said focal plane mask and movable between a normal position in which said auxiliary mask restricts the combined aperture of the masks to a given fractional portion of the data field, a second position in which the auxiliary mask masks the entire data field, and a third position in which the entire data field is exposed;

sensing means for sensing the control indicia on said instruments;

and selective control means, connected to said sensing means, for actuating said auxiliary mask to said second and third positions in successive machine cycles in response to sensing of said control indicia to photograph data substantially larger in size than that carried by some of the data instruments.

7. Selective masking apparatus for a cyclically operable photocomposing machine comprising means for positioning a series of instruments, at an exposure station, some of said instruments being data instruments each bearing composing data in a given elongated linear field and some being control instruments bearing predetermined control markings, a camera for photographing the data on data instruments located at said exposure station, and film advancing means for advancing a film through said camera in synchronism with movement of said instruments to said exposure station, said selective masking apparatus comprising:

a mask movable between a normal position in which a predetermined portion of the data field of the instrument at said exposure station is exposed and first and second auxiliary masking positions in which complementary portions of the data field are masked;

sensing means for sensing the control markings on said control instruments;

selective control means, connected to said sensing means, for moving said mask to said first and second masking positions in succeeding cycles of said photocomposing machine, in response to the sensing of a predetermined control marking;

film advance stop means connecting said sensing means to said film advancing means to prevent film advance in a given machine cycle in response to the sensing of said predetermined control marking;

and operation selection means for selectively enabling and disabling said film advance stop means to convert the apparatus to and from transverse and longitudinal selection of data from said field.

No references cited.