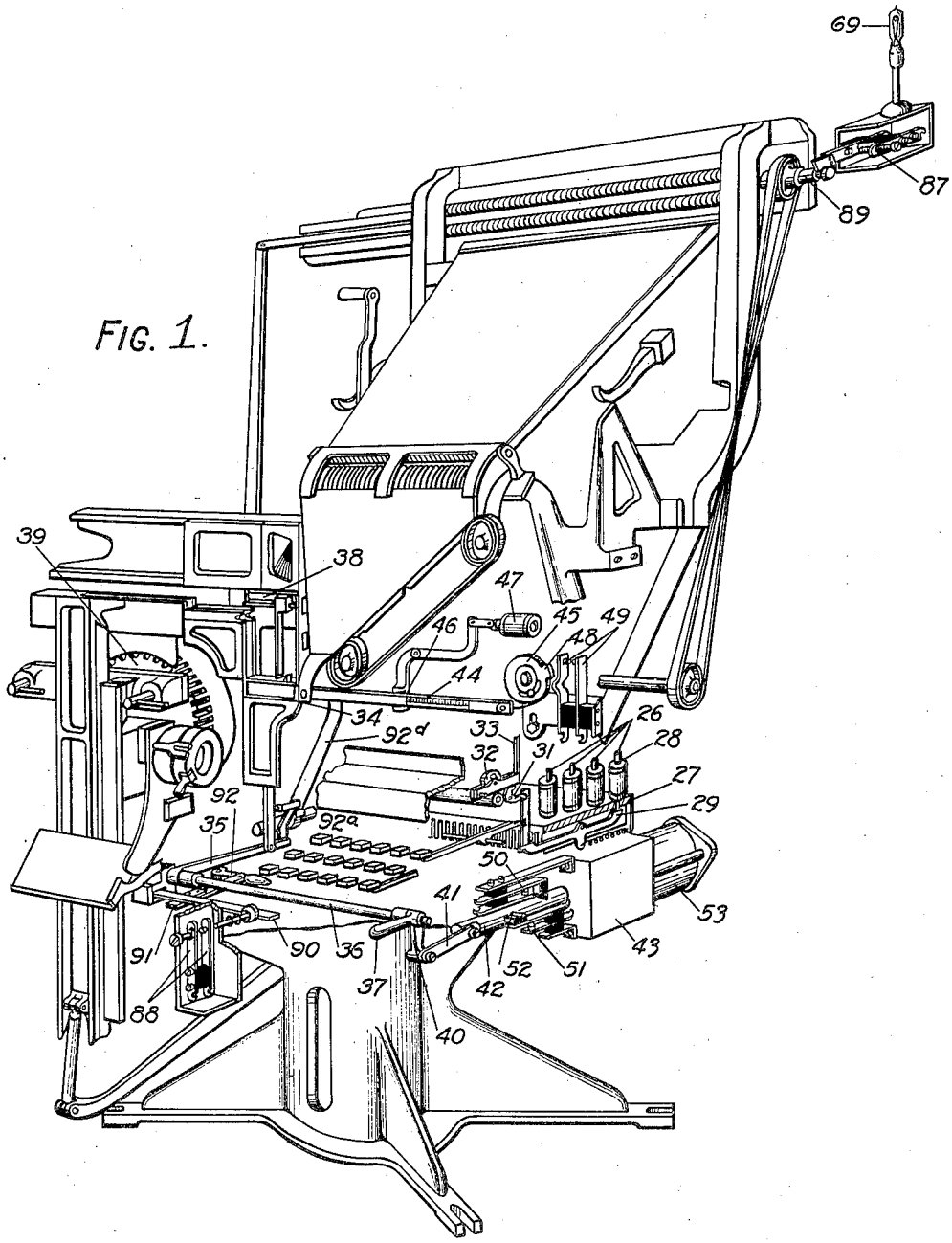
Aug. 21, 1934. E. E. KLEINSCHMIDT 1,970,566

SYSTEM AND APPARATUS FOR COMPOSING MACHINES

Filed June 5, 1929 4 Sheets-Sheet 1

FIG. 1.



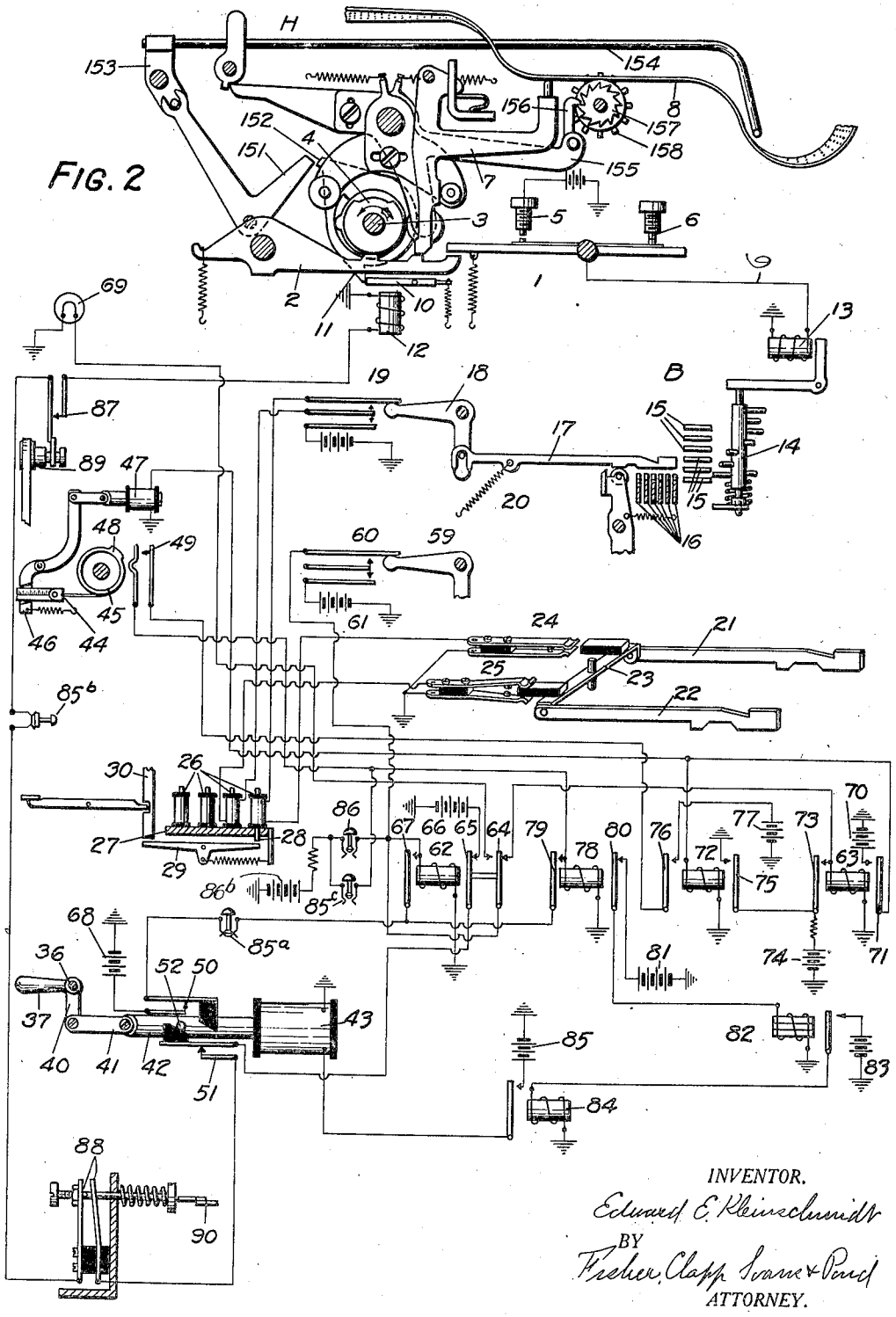
INVENTOR.
Edward E. Kleinschmidt
BY
Fisher, Clapp, Towne & Pond
ATTORNEY.

Aug. 21, 1934. E. E. KLEINSCHMIDT 1,970,566

SYSTEM AND APPARATUS FOR COMPOSING MACHINES

Filed June 5, 1929 4 Sheets-Sheet 2

FIG. 2



INVENTOR.
Edward E. Kleinschmidt
BY
Fisher, Clapp, Soans & Pond
ATTORNEY.

Aug. 21, 1934. E. E. KLEINSCHMIDT 1,970,566

SYSTEM AND APPARATUS FOR COMPOSING MACHINES

Filed June 5, 1929 4 Sheets-Sheet 3

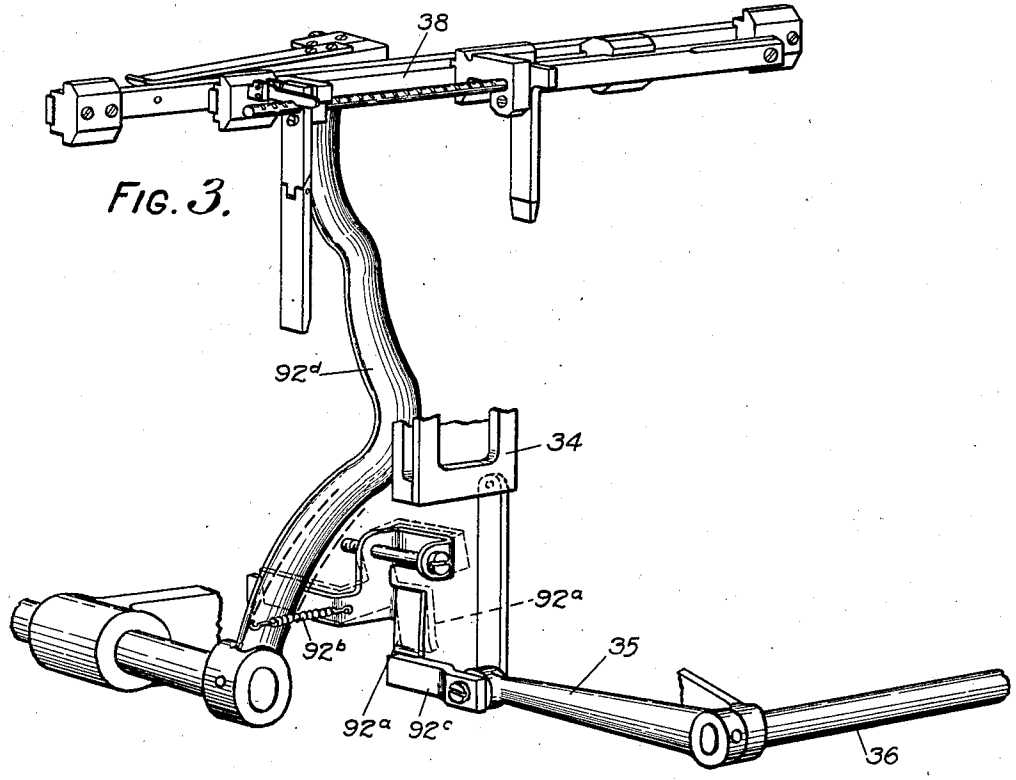


FIG. 3.

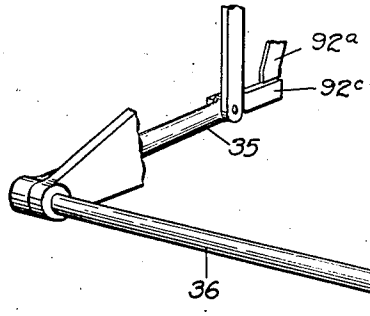


FIG. 4.

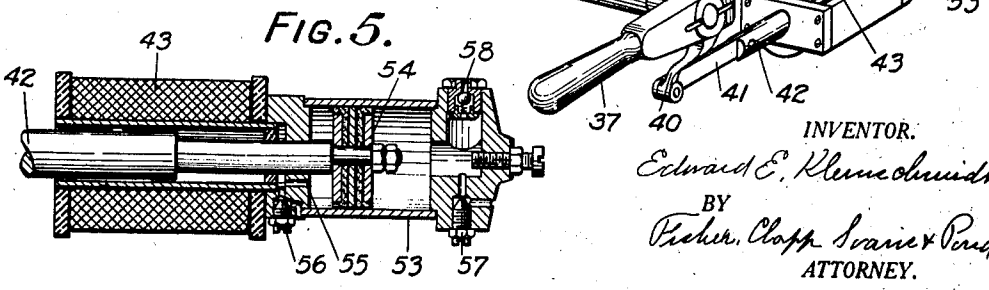


FIG. 5.

INVENTOR.
Edward E. Kleinschmidt
BY
Fisher, Clapp, Svaine & Pond
ATTORNEY.

Aug. 21, 1934. E. E. KLEINSCHMIDT 1,970,566

SYSTEM AND APPARATUS FOR COMPOSING MACHINES

Filed June 5, 1929 4 Sheets-Sheet 4

FIG. 8.

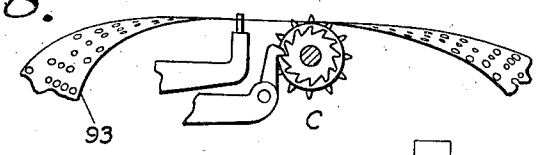


FIG. 6.

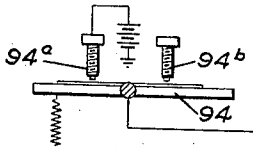
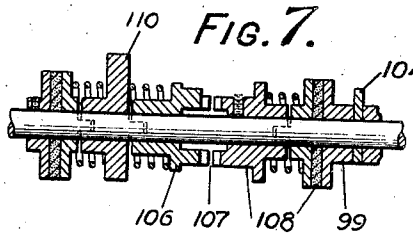


FIG. 7.



INVENTOR.
Edward E. Kleinschmidt
BY
Fisher, Clapp Evans & Reed
ATTORNEY.

Patented Aug. 21, 1934 1,970,566

UNITED STATES PATENT OFFICE

1,970,566

SYSTEM AND APPARATUS FOR COMPOSING MACHINES

Edward E. Kleinschmidt, Chicago, Ill., assignor, by mesne assignments, to Teletypesetter Corporation, Chicago, Ill., a corporation of Delaware

Application June 5, 1929, Serial No. 368,641

47 Claims. (Cl. 199—18)

The invention relates to systems and apparatus for effecting the automatic operation of composing, type setting and type casting machines and which is particularly applicable for use in connection with telegraph systems.

The invention seeks to provide an improved system and apparatus for effecting the automatic operation of type setting and casting machines and particularly linotype machines, and which is responsive to a relatively short code consisting of a definite number of units or elements for each signal, and such as can be efficiently employed in telegraph systems. A further object is to provide improved automatic apparatus which is under control of a set of permutation selecting elements corresponding in number to the units of the code and one or more of which are operated or conditioned at each setting or operation.

The features of the invention are hereinafter more fully set forth, are illustrated in the preferred arrangement in the accompanying drawings and more particularly pointed out in the appended claims.

Fig. 1 is a perspective view of a standard line or slug casting machine modified for use in the present system.

Fig. 2 is a diagram of the transmitter and selector units and the controlling circuits for the machine shown in Fig. 1.

Figs. 3 and 4 are perspective views and Fig. 5 is a sectional view of parts of the line casting machine.

Fig. 6 is a diagrammatic view of a receiving printer and reperforator and a common operating circuit therefor.

Fig. 7 is a detail section of a portion of the reperforator.

Fig. 8 is a detail view of a transmitter for imparting signals to the circuit shown in Fig. 6.

The system will first be described in connection with the telegraphic operation of line casting machines; that is, machines in which matrices are dropped into a holder until a sufficient number of matrices for a single line is assembled. This line is then cast and another line of mats set up, the matrices, after casting of the line, being re-distributed to the matrix holders for re-use.

A six-unit permutation code is preferably employed—that is to say, each of the character and function signals comprises two different electrical conditions in each of six successive time intervals or units. The system preferably employs a start-stop telegraph system, although multiplex or other types of telegraphs may be used. In the start-stop system, each group of code impulses is preceded by a starting interval, followed by a stopping interval so that for a complete signal there are eight time intervals or units.

A transmitter for sending signals to the selector mechanism may be located at a nearby or distant station, and is here described as of the automatic tape control type. The transmitter "A", Figure 2, is similar to the combined transmitter and distributor disclosed in United States Patent No. 1,564,421, dated December 8, 1925, see Figures 1 and 2 thereof. The transmitter there disclosed is adapted to a code comprising five code impulses and a start and a stop pulse or seven intervals in all. With the transmitter here used, there are six code or selecting intervals and start and stop intervals, making eight in all, the transmitter cams being staggered around the transmitting shaft with correspondingly shorter and closer operating sectors. Refer to Fig. 2, the transmitter comprises a contact arm 1, which is adapted to be actuated by the operation of any one of a series of levers 2. The latter, during each revolution of the shaft 3, are permitted to move upward one at a time during a series of successive time intervals by a spiral series of cams 4 on the shaft 3, and are selectively controlled to place the contact arm 1 either against contact 5 or contact 6, during such time intervals by a series of levers 7, the latter in turn being controlled by a perforated tape 8. The code which represents the different characters and special functions is represented on the tape by transverse rows of perforations, each row having one or more perforations and there being six different possible positions for the perforations in each transverse row. Thus, in the manner described in said prior patent, for each revolution of shaft 3, there will be transmitted on line 9 a signal composed of a start pulse followed by six code pulses and terminated by a stop pulse. Near the end of each signal period, the tape controlled levers 7 are disengaged from the tape, the tape is advanced one step and the tape controlled levers 7 are again engaged therewith, and thereby positioned in a different permutation in accordance with the next transverse row of perforations engaged.

The transmitter is provided with a stop arm 10, which is adapted to cooperate with a lug 11, on the transmitter shaft 3, to arrest the transmitter during the stopping interval at the end of any completed signal. In the arrangement shown, the stop arm 10 constitutes the armature

of a magnet 12. When the transmitter is in operation, the magnet is energized so that the stop arm is held in its inactive position and shaft 3 rotates continuously and transmits signals until arrested by the deenergization of magnet 12.

The transmitted signals control the operation of a selecting translator. The translator "B" is similar to that set forth in United States Letters Patent No. 1,567,392, dated December 29, 1925, and particularly in Figs. 4, 5, 6, 7 and 7—A of said patent. As in the case of the transmitter "A", the translator shown in the patent cited uses a code having five elements, whereas in the device here employed the code has six elements. The translator comprises a magnet 13, which responds to all of the signals transmitted by the contact arm 1. The armature of this magnet oscillates a rotary selector actuator 14 in an axial direction. The actuator 14 has one more pin than shown in the patent referred to and the spacing of consecutive pins is correspondingly diminished to allow for the additional pin. As described in said patent, the actuator, like the transmitter shaft 3, is driven from a motor through the medium of a friction clutch, and its rotary movement is initiated and arrested in response to the start and stop intervals at the beginning and end respectively of each signal period, and, during each revolution, the spiral series of pins thereon effect the positioning of a series of six latches 15, which, in turn, control the setting of a set of six notched permutation bars 16 in different combinations, the latter serving to select and permit the operation of a series of longitudinal movable actuator bars 17.

In the construction set forth in the prior Patent No. 1,567,392, the actuating bars 17 effect the operation of the type bars and function mechanisms of a telegraph typewriter. In the present arrangement, the bars 17 operate a series of levers 18, each of which normally holds open a set of contacts 19, but permits the closing of these contacts when the corresponding bar 17 is selected and moved forward against the tension of its spring 20. Two of the actuating bars 21 and 22 are arranged to move a centrally pivoted bar 23 in one direction or the other, and the latter in turn alternately opens and closes two sets of contacts 24 and 25. When one of the sets of contacts 19 is closed in response to a character signal, the local operating circuits of two of a series of solenoid magnets 26 are partially closed at the contacts 19, but the circuit of only one of the magnets thus selected is completed according to which of the case shifting contacts 24 or 25 is closed. It will be understood that contacts 24 are connected to the common return of one set or group of magnets 26, while the other set of contacts 25 is connected to the common return of another group of magnets 26. One of the contacts 24 or 25 and one set of the magnets 26 connected thereto corresponds to lower case characters and the other contact and group of magnets corresponds to upper case characters, so that any particular character signal may operate either one of two magnets, which one being determined by the position of the bar 23 when the signal is received. The bar is shifted by the operation of the bars 21 and 22 in response to "upper" and "lower" case or shift signals respectively.

The magnets 26 are mounted on a suitable support 27, and form a unit which is rigidly mounted to the frame of the casting machine just to the rear of the keyboard (see Fig. 1). A plunger 28 forming the core of each magnet is arranged to engage and operate a lever 29, pivoted in the support 27, in such a manner that one end engages one of the vertical trip bars 30 which form a part of the keyboard, and are adapted to release the triggers 31 of the standard casting machine, and which in turn allow the cams 32 to rotate and operate the reeds 33, which, in turn, operate the escapement mechanism to drop a matrix corresponding to the magnet energized. One of the magnets 26, when energized, operates the space band reed and drops a space band. The matrices as they drop fall in the usual manner and assume their proper position in the elevator carriage 34.

The elevator 34 is connected to an arm 35, attached to a shaft 36 (see Figs. 1, 3 and 4, respectively), which in the ordinary manual operation of the machine is rocked by handle 37, thus raising the line of matrices in elevator 34, so that they will be delivered to the cross carriage 38 that delivers the matrices to the casting mechanism 39, which operates in the usual manner and need not be further described. In the present system, however, an arm 40 on shaft 36 is connected by a link 41 to the plunger 42 of a large solenoid magnet 43. The standard type casting machine is provided with a device for measuring the length of the assembled lines of matrices and space bands, which consists of an assembler slide 44 connected by a cord to the spring-actuated drum 45, and having a friction brake 46 normally applied thereto. This brake, in the present invention, is capable of being released by a magnet 47, as, and for purposes later described. The assembler slide 44 moves to the left as the matrices are assembled and thereby rotates drum 45, which has attached thereto a cam 48 which in a certain position corresponding to a length of line which will cast, closes a pair of contacts 49. The cam 48 is preferably formed of two relatively adjustable discs so that the length of the high part may be varied to correspond to the variation of the length of line which will cast.

The solenoid 43 which, when energized, operates the elevator 34, controls two pairs of contacts 50 and 51 through a pin 52 on the solenoid core 42. Normally, the pin 52 holds the contacts 51 closed, but the latter are opened as soon as the solenoid starts its operating stroke after being energized. At the end of the operating stroke of the solenoid magnet, pin 52 opens the normally closed contacts 50. Attached to the rear of the solenoid magnet 43 is a dash pot 53 (see Fig. 5), and attached to the rear of the solenoid core is a piston 54, which fits airtight on the inner surface of dash pot 53. The chambers on each side of the piston 54 are airtight except that the one on the forward side connects to a vent 55 that is controlled by an adjustable valve 56. The rear chamber is provided with a similar adjustable vent and valve 57 and with a ball check valve 58 which will allow air to enter the rear chamber, but is sealed when the plunger 42 is operating due to the energization of magnet 43. By this arrangement, when the magnet is energized, the motion of the elevator upward can be so regulated by adjusting the air valves that it will gently carry the elevator upward and there will be no tendency for the matrices or space bands of the assembled line to jump out of place, and likewise the downward motion of the elevator may be regulated. It will be also noted that by this arrange-

ment, the elevator may be blocked, but as soon as the blocking is removed, the elevator will continue its travel since, as hereinafter described, the solenoid remains energized until the movement of its core is completed.

At intervals corresponding to the desired length of lines or slugs, the transmitter controlling tape is provided with perforations corresponding to a special line casting signal. In response to such a signal, the translator "B" effects the operation of a lever 59, and closes a set of contacts 60 (see Fig. 2). These contacts serve to close and operate a circuit from battery 61 to relay 62, and also to relay 63. Armature 64 of relay 62 is interposed in the circuit of relay 63, but relay 62 is relatively slow acting to permit the operation of relay 63 whenever the contacts 60 are closed, and before its circuit is opened by the operation of relay 62. Armature 65 of relay 62 normally closes circuit from battery 66 through the coil of the transmitter stop magnet 12, so that when relay 62 is energized, the magnet 12 is deenergized and the stop arm 11 is placed in a position to arrest the operation of the transmitter at the end of a completed signal. The operation of relay 62 also closes through its armature 67 a locking circuit from battery 68 through the coil of relay 62, and the operation of the transmitter and the translating selector controlled thereby is arrested and cannot again start while this locking circuit is closed. A circuit is also closed from battery 68 through the front contacts of armatures 64 and 67 of relay 62 to a suitable type of indicator or lamp 69, which is preferably mounted on the upper portion of a casting machine as shown in Fig. 1, so that it is readily visible from a distance; obviously, a gong or other suitable signalling devices might be used as desired.

The operation of relay 63 closes the circuit from a battery 70 through contacts controlled by its armature 71 and thence in parallel through the solenoid 47 and the coil of relay 72. Solenoid 47 releases the brake on the line adjusting and measuring device so that the spring in the drum 45 can take up all slack in the assembled line and then if the line is the proper length, the contacts 49 will be closed by the cam 48. Armature 73 of relay 63 closes a locking circuit for this relay from the battery 74, but the circuit of relay 72, as stated, is closed when the armature 71 of relay 63 is pulled up and armature 75 of relay 72 short-circuits battery 74 and cuts off the holding current for relay 63; thus the impulse to the line proving magnet 47 is quite short since it is necessary to make sure that the assembled line of matrices and space bands is of the proper length and to re-apply the brake 46 before the line casting operation is initiated. Relays 63 and 72 thus operate momentarily, but relay 62 remains operated and holds the transmitter and the selecting translator at rest.

If the line is of proper length, the contacts 49 are closed, and these contacts in connection with the armature 76 of relay 72 close a circuit from battery 77 through the coil of relay 78. Armature 79 of relay 78 closes and locks a circuit through its own coil from battery 68, and its armature 80 opens a normally closed circuit from the battery 81, through the coil of relay 82. The latter relay is a slow release relay and, after a time interval, its armature closes a circuit from battery 83 to a relay 84, and the latter closes a circuit from battery 85 through the operating solenoid 43. The solenoid then operates the rock shaft 36 of the line casting machine, lifts the elevator 34 with the assembled line of matrices, and, when raised, as in a standard line casting machine initiates the operation of the transfer carriage 38 and the line casting mechanism 39.

The initial operating movement of the core 42 of solenoid 43 opens the contacts 51 which are in the circuit of the transmitter stop magnet 12, so that the transmitter cannot be released for operation until the elevator operated by solenoid 43 has delivered the assembled line of matrices to the type casting mechanism and returned to its normal position to permit the assembling of another line of matrices. At the end of the forward operating stroke of the solenoid core 42, the contacts 50 are separated and open the locking circuits of relays 62 and 78, relay 82 is then again energized and relay 81 and solenoid 43 are deenergized, and the armatures of these relays are returned to normal. However, as stated above, the circuit of magnet 12 is not completed until the core 42 of the operating solenoid 43 has returned to normal position and closed the contacts 51. When this occurs, stop arm 10 is removed from engagement with the lug 11 and the operation of the transmitting distributor is initiated to proceed with the transmission of signals to assemble another line of matrices.

In case the assembled line of matrices is too long or too short, the contacts 49 will not be closed and relays 78, 82 and 84, controlled thereby, will not be operated in response to a line casting signal to close the circuit of solenoid 43. However, relay 62 will invariably be operated in response to such a signal to arrest the operation of the transmitter and selector as described and also to operate the indicating lamp 69. This lamp will then continue to burn and by this continued illumination, indicate to the supervisor that that particular machine needs attention. The supervising operator may then open switch 85^b to prevent the starting of the transmitter; operate push button 85^a, to return all of the relays to normal; complete or correct the line by hand, and, when the line is the proper length, press button 86 to close a circuit from battery 86^b through the relay 62 and 63, and thereby initiate and effect the operation of the elevator and line casting mechanism. Then by closing switch 85^b, the transmitter is started. Another button 85^c is provided for energizing relay 78 to start the elevator when the contacts 49 are open, whereas button 86 will start the elevator only when contacts 49 are closed, i. e. only when line of matrices is correct length.

Preferably additional safety devices are provided for controlling the start-stop magnet 12, and for this purpose two sets of contacts 87 and 88 are interposed in its energizing circuit. These contacts remain closed during the normal operation of the machine. The contacts 87 are operated by a clutch member 89, which is provided on the standard type casting machine and is automatically disengaged by reverse, bent, or otherwise defective or improperly placed matrices to stop the operation of the matrix distributing mechanism. The contacts 88 are normally held closed by a lever 90, which is shifted by a link 91 and a start-stop lever 92, when a line fails to cast, and thereby permits the opening of contacts 88 to stop the transmitter. Lever 92 is provided on the standard line casting machine and operates automatically to arrest its operation when a line fails to cast because too long.

Still another safety device is provided to prevent the operation of the elevator before the cross carriage has returned to its normal position. There is provided for this purpose an arm 92a (see Fig. 3), having a spring 92b which tends to pull it into the path of a lug 92c on arm 35, to block the upward movement of the elevator 34. Arm 92d is the operating arm for the cross carriage 38 which receives the assembled line of mats from the elevator and delivers it to the casting mechanism. When the cross carriage is returned completely to normal position and is ready to receive a new line, arm 92d engages stop arm 92a and holds it from the path of lug 92c. With this arrangement, the elevator can only rise when the cross carriage is in receptive position. If the elevator solenoid is engaged when the safety stop 92a is in operative position, it will remain energized and will lift the elevator as soon as the safety stop is shifted to its normal position which is shown in dotted lines in Fig. 4.

Refering to Figs. 6 and 8, respectively—"C" is an automatic transmitter the same as that already described and shown at "A", in Fig. 2, and is located at a station distant from the composing machines. At the station, or stations, where the composing machines are located, there is a page printer "E", and a reperforator "D", each preferably controlled by a single selector magnet. The page printer "E" is like that shown in United States Patent No. 1,567,392, issued to E. Kleinschmidt, December 29, 1925, except that instead of having five permutation code bars, it has six and substantially twice the number of type bars. The reperforator "D" has a single magnet controlled selecting device like that shown in U. S. Letters Patent No. 1,884,743, dated October 25, 1932.

The selecting mechanism will not here be described in detail, as it is amply described in the above mentioned patent, except that in the present perforator, instead of five selecting elements, there are six, as has been the case in all the other parts so far described.

A perforated tape 93 is provided at the transmitting station and placed in the transmitter "C", and as the latter operates, contact arm 94 is oscillated between contacts 94a and 94b according to the perforations in the tape, and there are sent out on line 95, start-stop signals comprising a start pulse, six code pulses, and a stop pulse, just as described in connection with transmitter "A". These impulses operate the magnet 96 of the printer "E", and the magnet 97 of the reperforator "D". As the signals are received by magnet 96, there will be printed on the sheet 98, printed matter corresponding to the signals received and as described in the above mentioned patent. As the signals are received by magnet 97, selector shaft 99 will make a signal revolution for each signal period, and as described in the above mentioned application, the selecting elements 100, through levers 101, will set the interfering arms 102 in positions corresponding to the signal received, and those corresponding to marking pulses will be so positioned that their thick portions will be in line with the punching pins 103, and a corresponding perforation will be made in the tape, while those corresponding to spacing signals will have a relieved portion opposite the punching pins and no perforations will be made. Near the end of the revolution of selecting shaft 99, cam 104 will move arm 105, and so allow the driven member 106 of clutch 107 to engage the constantly rotating member 108, driven by motor 109. Connected to member 106 is a cam 110, which, through lever 111, moves the interfering levers 102 upward so that those corresponding to marking conditions engage corresponding punching pins 103, while those corresponding to spacing conditions do not engage. There will accordingly be perforated in paper tape 112, a cross row of perforations corresponding to the signal received, and at the same time feed holes are formed in the well known manner. When lever 111 is moved to perforate, a projection 113 on lever 114, moves arm 115 and a pawl 116 on this arm to the left, so that the pawl engages another tooth in ratchet wheel 117, and when levers 111 and 114 return to normal, a spring 118 returns arm 115 and pawl 116, and moves ratchet wheel 117 one tooth, and thereby advances the tape 112 to bring a fresh portion of tape in position to receive the perforations corresponding to the next signal. It will be understood that each of the units referred to above are driven by a motor having a speed regulating governor.

Obviously modifications and changes in the details set forth can be made without departure from the scope of the appended claims.

I claim as my invention:

1. In combination, a composing machine, a control unit mechanically attached to the composing machine and adapted to initiate all the functions of the composing machine, a transmitting unit mechanically independent of the control unit but electrically connected thereto, means included in the transmitting unit to transmit electrical impulses to the control unit to selectively operate the composing machine, and means attached to the composing machine to control the transmitting unit.

2. In combination, a type casting machine having matrix assembling and type casting mechanism, a transmitter remote therefrom, means controlled by said transmitter for transmitting code combinations of impulses to said type casting machine, means responsive to said code combinations of impulses for variably operating said type casting machine in accordance with said received code, and means controlled by said machine for controlling the operation of said transmitter.

3. In combination, a first station comprising a transmitter, a second remote station comprising a type casting machine, means controlled by said transmitter for transmitting code combinations of impulses to said second station, means at said second station responsive to said impulses for selectively operating said type casting machine, and means controlled by said type casting machine for selectively controlling said transmitter.

4. In combination, a machine having matrix assembly and type casting mechanism, a transmitter remote therefrom, means controlled by said transmitter for variably controlling the operation of said machine, and means controlled by said type casting machine for controlling the operation of said transmitter.

5. In combination, a type casting machine having matrix assembly and type casting mechanism, a transmitter remote therefrom, means controlled by said transmitter for transmitting code combinations of impulses to said type casting machine, means responsive to said code combinations of impulses for variably operating said type casting machine in accordance with said received code, and means operative in the event said type casting machine fails to respond to

said code combinations of received impulses for stopping the operation of said transmitter.

6. In combination, a type casting machine having a matrix assembling and type casting mechanism, selecting apparatus responsive to code combinations of impulses for variably operating said assembling and type casting mechanism, and line proving means jointly controlled by said selector apparatus and said mechanism for controlling line feed on said machine.

7. In combination, a type casting machine having a matrix assembling and type casting mechanism, a line proving means, selector apparatus for variably operating said matrix assembling and type casting mechanism, means on said machine for controlling the automatic operation of said mechanism, and means controlled by said selector for variably operating said line proving means jointly with said automatic means.

8. In combination, a type casting machine having matrix assembling and line casting mechanisms, selector apparatus for automatically effecting the operation of said mechanisms, and line proving means for automatically preventing the operation of the line casting mechanism in event the assembled line exceeds or is less than certain predetermined lengths, substantially as described.

9. In combination with a composing machine comprising matrix assembling mechanism, elevator mechanism, and mechanism to deliver a line of matrices to the casting mechanism, selector mechanism for automatically effecting the operation of the matrix assembling mechanism and the elevator mechanism, and means controlled by the matrix assembling mechanism to automatically prevent the operation of the elevator mechanism when a line of matrices is over a specified length.

10. In combination, a composing machine having matrix selecting and type casting mechanisms, a device adapted to automatically control the operation of said composing machine, said device including means independent of the driving means of the composing machine to determine the rate of operation of the composing machine.

11. In combination, line casting mechanism, a plurality of matrices, mechanism to assemble said matrices in lines, mechanism to deliver the assembled line of matrices to the casting mechanism, manually operable, key controlled means to operate the matrix assembling mechanism and initiate the operation of the matrix delivery mechanism, and automatic means to control the further operation of the delivery mechanism and the return of the delivery mechanism to its initial position.

12. In combination, type casting mechanism, matrix assembling mechanism, delivery mechanism to move the assembled line of matrices to the casting mechanism, key controlled means to operate the matrix assembling mechanism and key controlled means to initiate the operation of the delivery mechanism, and automatic means to control the further operation of the delivery mechanism.

13. In combination, type casting mechanism, matrix delivery mechanism, a solenoid magnet effective to operate said delivery mechanism and air cushioning means to control the speed of the delivery and return movements of said delivery mechanism.

14. In combination, type casting mechanism, matrix delivery mechanism, an electro-magnet solely effective to operate said delivery mechanism, and means to deenergize said electro-magnet when said delivery mechanism has completed its operation.

15. In combination in a type casting machine, matrix assembling mechanism, matrix delivery mechanism, a solenoid electro-magnet solely effective to operate said delivery mechanism, and means to energize said magnet at the completion of the assembly of a group of matrices.

16. In combination in a type casting machine, matrix assembly mechanism, matrix delivery mechanism, an electro-magnet to operate said delivery mechanism, and automatic means to control said matrix assembling mechanism and energize said magnet at the completion of the assembling of a group of matrices.

17. In combination with a composing machine, including matrices and matrix release mechanism, individual operating magnets therefor, means to transmit a succession of code signals adapted to control said matrix release magnets, the number of signals being sufficient to operate the release mechanism corresponding to only part of the magnets, and means controlled by two special signals to cause the code signals to operate two different groups of magnets.

18. In combination in a type composing machine, a plurality of groups of characters, a plurality of groups of signal-operated magnets, one group of magnets adapted to control one group of characters, and another group of magnets adapted to control another group of characters, and means responsive to two special signals for rendering either group operative.

19. In combination in a type composing machine, means to operate the composing machine according to perforations in a tape, means for intermittently feeding the tape step by step from a group of perforations representing one character to a group representing the next character, and means controlled by the composing machine to stop said step by step feeding means.

20. In combination in a composing machine, matrix assembling mechanism, elevator mechanism and transfer mechanism for conveying a line of matrices from the elevator mechanism to the casting mechanism, automatic means to actuate the elevator mechanism, and means operated by said transfer mechanism to prevent or permit the operation of said automatic elevator actuating means.

21. In combination in a composing machine, matrix assembling mechanism, elevator mechanism, automatic means to operate the elevator mechanism including a slow acting relay to delay the elevator operation until the last matrix has assumed its position.

22. In combination in a composing machine, a tape controlled device adapted to control the composing machine, means controlled by the composing machine to stop the operation of the tape controlled device, and means to indicate stoppage of said device.

23. In combination, a composing machine, matrix distributing mechanism, a device operative in accordance with a control form to determine the operation of said composing machine, and means operated by the distributing mechanism to control said device.

24. In combination, a type casting machine, a tape-controlled selector mechanism for effecting the automatic operation of the type casting machine, and means controlled both by the tape and the line casting machine for automatically

stopping and starting the operation of the selector mechanism.

25. In combination, a type composing machine having a tape-controlled selector mechanism, tape supplying means, feeding means for the tape, and means controlled both by the tape supplying means and the type composing machine for automatically arresting the feed of the tape and the operation of the selector mechanism controlled thereby.

26. In combination, a type casting machine having matrix assembling and line casting mechanisms, a tape-controlled selector mechanism for effecting the automatic operation of said assembling and casting mechanisms, means for supplying the tape, feeding means for the tape, and stop and start devices for the tape feed automatically controlled by the selector and line casting mechanism and by the tape supplying means.

27. In combination in a type casting machine, matrix assembling and line delivering mechanisms, a tape-controlled selector mechanism responsive to code signals for operating said assembling mechanism, means for feeding the tape, and independent devices each directly controlled by the selector mechanism in response to signals for arresting the feed of the tape and initiating the operation of the line delivery mechanism.

28. In combination in a type casting machine, matrix assembling and line delivering mechanisms, a tape-controlled selector mechanism responsive to code signals for operating said assembling mechanism, means for feeding the tape, independent devices each directly controlled by the selector mechanism in response to signals, one for arresting the feed of the tape and the further operation of the selector mechanism and another for initiating the operation of the line delivery mechanism, and means controlled by the return of the line delivery mechanism to normal position for again starting the feed of the tape and the operation of the selector mechanism.

29. In combination, a line composing machine adapted to be operated through a manually operated keyboard, and means for operating the composing machine automatically, including a series of elements operated permutably in accordance with code perforations in a strip, means selected for operation on each permuted setting of said elements, a member effective for operating the selected means, means controlled through the operation of the selected means for assembling a line of matrices, and mechanism also controlled by said series of elements upon a different permuted setting thereof for acting on the line of assembled matrices.

30. In combination, a line composing machine adapted to be operated through a manually operated keyboard, and means for operating the composing machine automatically, including a series of elements operated permutably in accordance with code perforations in a strip, means selected for operation on each permuted setting of said elements, a member effective for operating the selected means, means controlled through the operation of the selected means for assembling a line of matrices, and mechanism also controlled by said series of elements upon a different permuted setting thereof for raising said line of assembled matrices to the line delivering position.

31. In combination in a type composing machine, means to operate the machine according to perforations in a tape, means for intermittently feeding the tape step by step from a group of perforations representing one character to a group representing the next character, a series of permutation elements set for each group of perforations, means controlled by the setting of said elements for determining the character matrices to be assembled, and means controlled by the composing machine to control the step by step motion of the tape.

32. In combination in a type composing machine having an elevator, means to operate the machine according to perforations in a tape, means for intermittently feeding the tape step by step from a group of perforations representing one character to a group representing the next character and finally to a group representing an elevator signal, a series of permutation elements set for each group of perforations, means controlled by the setting of said elements for determining the character matrices to be assembled in the elevator, and following such assembly to control the raising of said elevator to the line delivering position, and means controlled by the composing machine to stop the step by step motion of the tape.

33. In combination in a composing machine, matrix assembling mechanism, elevator mechanism, and transfer mechanism for conveying a line of matrices from the elevator mechanism to the casting mechanism, a series of permutation elements set permutably in accordance with a group of perforations in a tape, automatic means to operate the elevator mechanism in accordance with the setting of said elements, and means operated both by the transfer mechanism and the permutation elements for controlling the operating of said automatic means.

34. In combination in a composing machine, matrix assembling mechanism, elevator mechanism, automatic means to operate the elevator mechanism, a transfer slide cooperating with the elevator mechanism, and a lever operated by the transfer slide for controlling the effectiveness of said automatic means on said elevator.

35. In a type casting machine, the combination with matrix assembling, elevator, transfer and line casting mechanisms, of selecting means for automatically controlling the operation of the matrix assembling mechanism and for initiating the operation of the elevator mechanism, line proving means and means controlled by the line proving means, and by the transfer mechanism for preventing or permitting the operation of the elevator mechanism.

36. In combination in a line composing machine, an automatic control unit including a series of selecting elements, means to operate the elements in permutations by setting one or more of the elements at each operation according to code impressions on the control form, devices materially greater in number than the selecting elements and selected in accordance with the permutated settings of said elements to control the assembly of a line of matrices, and means controlled by a different permutated setting of said elements to act on the assembled line of matrices.

37. In combination in a composing machine, matrix assembling mechanism, a record controlled unit adapted to determine the operation of said matrix assembling mechanism in accordance with information on a control form, means to operate the record controlled unit step by step for each assembling operation and means operat-

ed by the assembling mechanism to control the step by step means.

38. In combination in a composing machine, an elevator, a set of selectors, means controlled solely by said selectors for assembling matrices in the elevator, transfer mechanism for conveying a line of matrices from the elevator to casting position, means to actuate the elevator automatically in response to a particular condition of said selectors, and means controlled by the transfer mechanism when it is in its line receiving position to determine the operation of the elevator actuating means.

39. In combination in a composing machine, an elevator, means responsive at each operation to one or more formations on a control strip for assembling matrices in the elevator, transfer mechanism actuated in response to the operation of the elevator for conveying a line of matrices from the elevator to a casting position, means responsive to special formations on the control strip to actuate the elevator, and means operative in the off-normal positions of the transfer mechanism to prevent the operation of the elevator actuating means.

40. In combination in a composing machine, matrix assembling mechanism, elevator mechanism, means operated automatically in response to formations on a control form to operate the elevator mechanism, a transfer slide cooperating with the elevator mechanism, and means operated by the transfer slide when it is in its normal line receiving position to free the elevator mechanism for operation by said automatic means.

41. In combination in a type casting machine having a line transfer mechanism, a selector mechanism responsive at each operation to one or more formations on a control form for effecting the automatic operation of the said machine, and means controlled jointly by the form and the position of the transfer mechanism for permitting or preventing the complete operation of the casting machine.

42. In combination in a composing machine, matrix assembling mechanism, elevator mechanism, and transfer mechanism for conveying a line of matrices from the elevator mechanism to the casting mechanism, a series of permutation elements set in accordance with character formations on a control form, automatic means to operate the elevator mechanism in accordance with the setting of said elements, and means controlled jointly by the position of the transfer mechanism when it is in its line receiving position and permutation elements for controlling the operation of said automatic means.

43. In a casting and composing machine, an elevator for raising the assembled matrices, a delivery slide for conveying the assembled matrices, an automatically controlled unit including means for actuating said elevator, and means conditioned upon the completed performance and return to normal on the part of said delivery slide for enabling the further operation of said elevator.

44. In combination in a line composing machine adapted to be actuated through a manually operated keyboard, and means for operating the composing machine automatically, including a series of permutation elements conditioned at each operation operative in accordance with one or more code perforations in a strip to effect the permuted settings thereof, a plurality of selectable devices materially greater in number than the said elements and selected for operation by the permutated settings thereof, means controlled through the operation of the selected devices for assembling a line of matrices, and mechanism also controlled by said series of elements upon a different permutated setting thereof for acting on the line of assembled matrices.

45. In combination in a type composing machine, means to operate the composing machine according to character formations on a controlled strip, means for feeding the controlled strip step by step and means independent of the composing machine to determine the rate of operation of said step by step action.

46. In combination in a type casting machine, matrix assembling and line delivering mechanisms, a tape controlled selector mechanism responsive to code signals for operating said assembling mechanism, means for feeding the tape, and independent devices each directly controlled by the selector mechanism in response to the same line signal for arresting the feeding of the tape and initiating the operation of the line delivery mechanism.

47. In combination, a first station, a second station, a composing machine at the first station, a transmitter at the second station, a circuit connecting said stations, means to transmit over said circuit code signals, means to control the composing machine variably by said signals according to the character to be composed, an additional signalling circuit connecting the two stations over which signalling conditions are impressed from the composing machine to control the transmitter.

EDWARD E. KLEINSCHMIDT.