

Aug. 8, 1967

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3,334,582

RESET SIGNALLING DEVICE FOR VARIABLE DATA PRINTING MACHINE

Filed Aug. 12, 1965

3 Sheets-Sheet 1

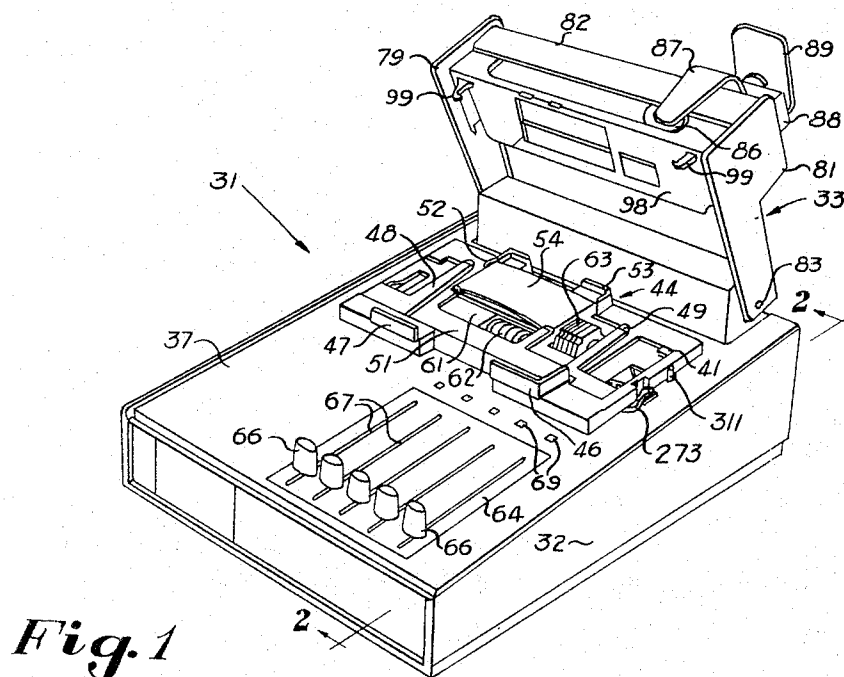


Fig. 1

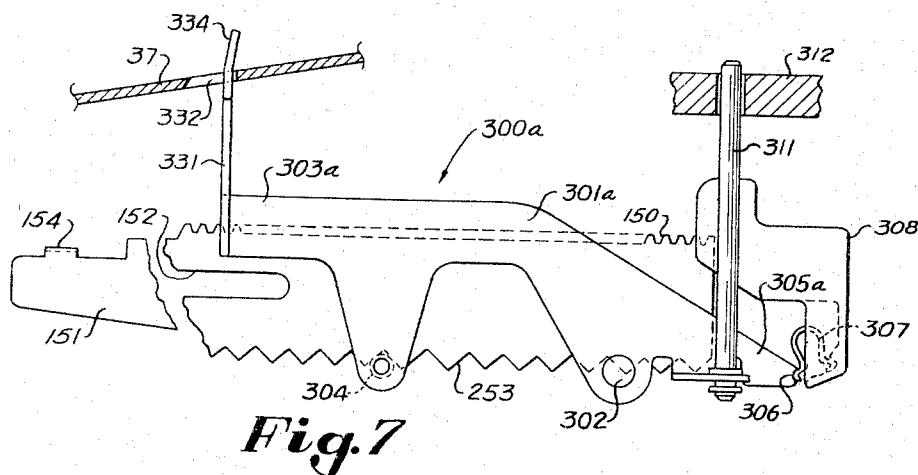


Fig. 7

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3 Sheets-Sheet 2

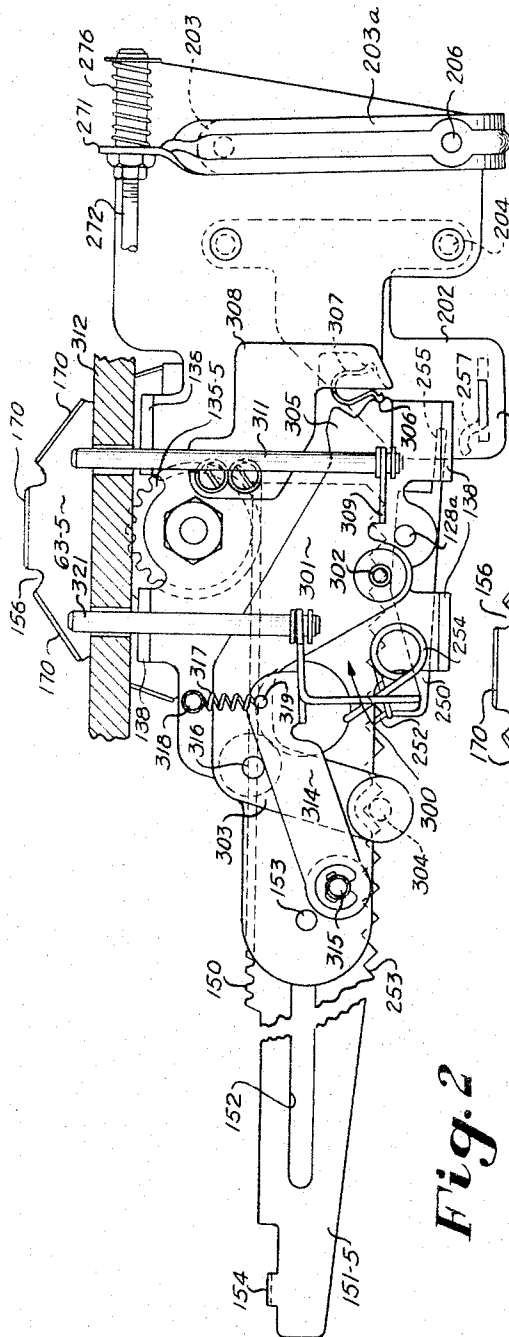


Fig. 2

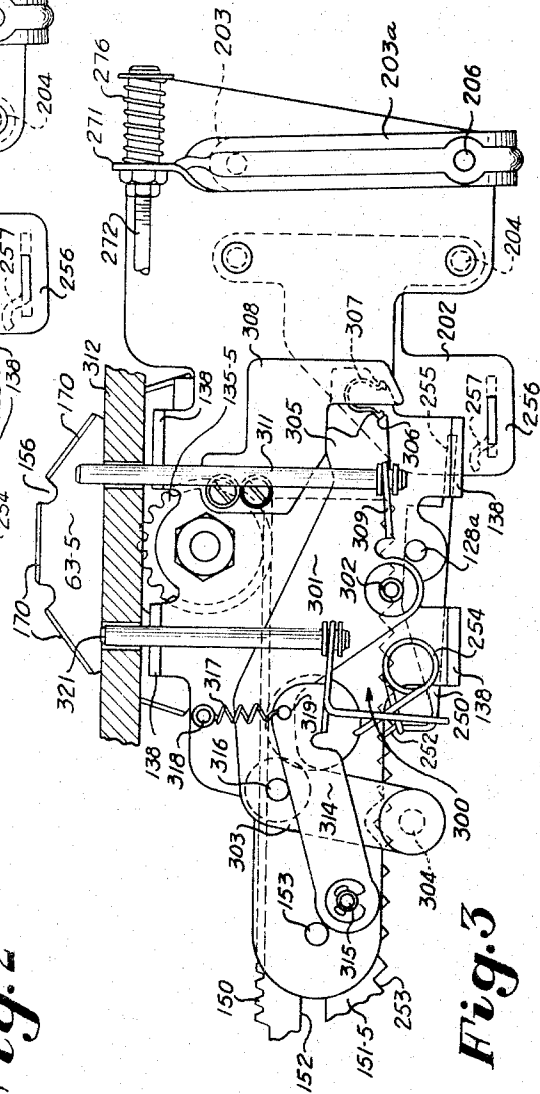


Fig. 3

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3 Sheets-Sheet 3

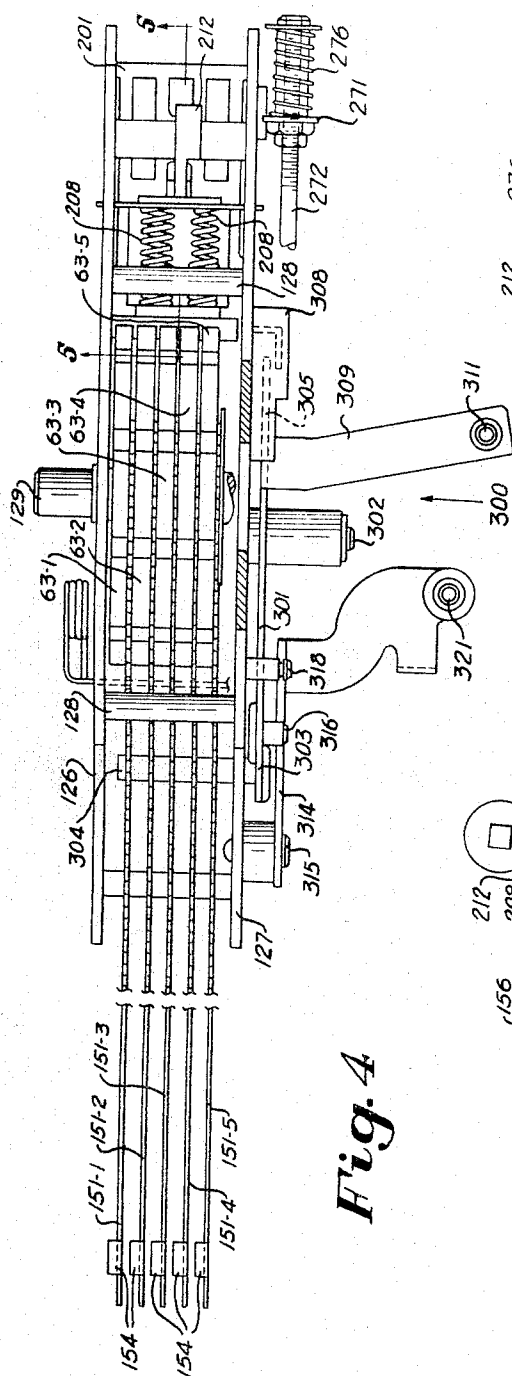


Fig. 4

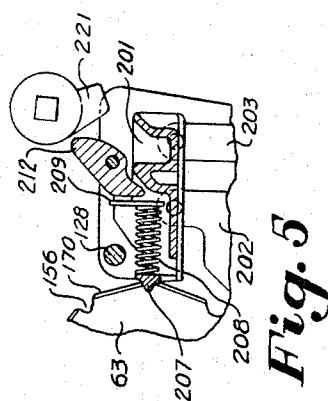


Fig. 5

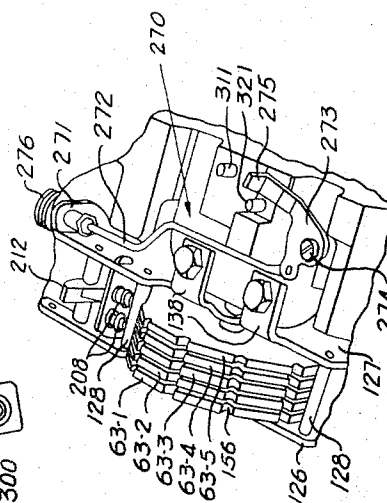


Fig. 6

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RESET SIGNALLING DEVICE FOR VARIABLE DATA PRINTING MACHINE

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Filed Aug. 12, 1965, Ser. No. 479,229

5 Claims. (Cl. 101-45)

This invention relates to printing machines and particularly to manually operated printing machines of the kind in which variable data are imprinted from individually settable printing devices mounted within the machine. More specifically, the invention relates to a new and improved signalling apparatus for signalling the machine operator that a new data setting operation is required following completion of a given printing operation; in its preferred form, the signalling device of the invention provides a positive interlock preventing a further printing operation until such time as the machine has been reset for printing different data than in a previous printing sequence.

In retail credit systems of various kinds, such as those used in automotive service stations, large department stores, and the like, fixed data identifying each customer is imprinted upon appropriate sales forms, from a printing device retained in the possession of the customer, in the course of each transaction. Many of the printing machines utilized for applications of this nature also include variable data imprinting apparatus for imprinting the same sales form with variable data indicating the amount of the sale. A preferred form of printing machine of this general kind is described and claimed in Patent No. 3,138,091 of John A. Maul, issued June 23, 1964. The signalling device of the present invention is described herein as applied to a printing machine of the kind shown in the aforesaid patent to Maul No. 3,138,091; it should be understood that the invention is equally applicable to other comparable printing machines capable of imprinting variable data relating to sales transactions and like applications.

In the course of operation of variable data imprinting machines in credit sales systems and similar applications, the machine operator is frequently in a hurry and subject to numerous distractions. Consequently, the operator may forget to reset the individual type devices or equivalent apparatus of the printing machine, with the result that the variable data pertaining to one sales transaction is printed on a sales form or other document pertaining to a second and wholly different transaction. It will be recognized that this kind of error is highly undesirable. Thus, the need for a protective signalling device, cautioning the operator that the variable data imprinting apparatus of the machine should be reset for a current transaction, is readily apparent.

In somewhat similar printing apparatus known in the prior art, provision has been made for automatically resetting the variable data imprinting apparatus to zero following each complete printing cycle. Some machines of this kind have also provided means to prevent a subsequent printing operation until at least a part of the variable data imprinting apparatus is reset for new data for a subsequent transaction. In other prior art signalling or interlocking devices, the complete variable imprinting apparatus must be reset manually to zero before a second printing operation can take place. The manual reset to zero, however, imposes an additional burden on the already limited time of the machine operator that is quite undesirable. Moreover, and particularly with respect to automatic reset systems, the previously known apparatus has been generally cumbersome and expensive, highly

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undesirable characteristics in view of the fact that each sales station in the credit sales system must be equipped with a complete printing machine and the cost of these machines may be a quite significant factor determining whether the overall system is economically practical.

It is a principal object of the present invention, therefore, to provide a new and improved reset signal device for a variable data printing machine of the manually settable, manually operable type adapted for use in credit sales systems and in similar applications. It is a related object of the invention to provide a simple and inexpensive positive signalling device that also affords a direct interlock in the variable imprinting apparatus that prevents initiation of a new printing operation until at least some portion of the variable data printing apparatus is reset in accordance with a new transaction.

Another object of the invention is to provide fully automatic reset signalling, and preferably interlocking, in a manually operable variable data recorder without necessitating resetting of the variable data recording apparatus to zero or to any other home position, while at the same time affording a positive indication that the data recorder must be reset in accordance with a new transaction prior to initiation of each recording operation.

A particular object of the invention is to provide an over-center mechanism, in a signalling or interlocking system for preventing repetitive operation of a variable data recorder without resetting of the data recording apparatus, which over-center mechanism effectively reduces wear on the operating components of the reset signalling apparatus and the data recorder itself but inherently affords a positive signalling action.

An additional object of the invention is to afford a simple, economical, yet virtually foolproof signalling or interlocking apparatus for a variable data recorder of the manually operated kind suitable for use in retail credit sales systems and like applications.

Thus, the present invention is incorporated in a variable data printing machine of the kind comprising a plurality of individual type devices each settable to a plurality of different positions to present different type characters at a printing position and each including a plurality of spaced index elements aligned with similar index elements of the remaining type devices whenever said type devices are set for a printing operation. The printing machine further comprises imprinting means movable along a predetermined path in an imprinting motion to imprint a recording sheet engaging the aforesaid type characters. A reset signalling device constructed in accordance with the invention comprises a print sensing element interposed in the path of the imprinting means and displaceable from an initial position to a second position each time the imprinting means moves through its imprinting motion. A type set sensing element engages the index elements and is displaced from a first position to a second position whenever one of the type devices is set to a different type setting. An over-center, bi-stable signalling device is connected to both of the sensing elements and is moved back and forth between two stable positions. Displacement of the print sensing element to its second position results in actuation of the signalling device to a first stable position indicating that a printing operation should not proceed until the type devices have been reset, and also resets the type set sensing element to the initial position previously described. Displacement of the type set sensing element to its second position results in actuation of the signalling device to a second stable position indicating that the printing operation may proceed, and also resets the print sensing element to its first position.

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 made as desired by those skilled in the art without departing from the present invention.

In the drawings:

FIG. 1 is a perspective view of a variable data recording machine equipped with a signalling and interlocking device constructed in accordance with a preferred embodiment of the present invention;

FIG. 2 is an elevation view of the variable data recording mechanism of the machine of FIG. 1, showing the signalling and interlocking system of the present invention taken approximately along line 2—2 in FIG. 1;

FIG. 3 is an elevation view similar to FIG. 2 but showing the signalling and interlocking device of the present invention in a different operating position;

FIG. 4 is a plan view of the variable data recording apparatus and the reset signalling and interlocking device of the present invention;

FIG. 5 is a detail view of a part of the variable data imprinting mechanism taken approximately along line 5—5 in FIG. 4;

FIG. 6 is a detail perspective view of the interlocking mechanism and a part of the variable data recording apparatus; and

FIG. 7 is a simplified elevation view, similar to FIG. 2, of another form of the invention.

FIG. 1 illustrates a printing machine 31 of the kind described in the aforementioned patent of John A. Maul, No. 3,138,091, equipped with a reset signal and interlocking device constructed in accordance with the present invention. The printing or data recording machine 31 comprises a base 32 and a printing head 33. The printing head 33 is pivotally mounted upon the base 32 for movement into and out of printing position relative to the base. In FIG. 1, the printing machine 31 is shown with its printing head 33 pivoted clear of the base 32 to permit insertion of a sales transaction form or other data recording sheet in the machine. For a printing operation, the printing head 33 is pivoted in a counterclockwise direction from the position shown to bring the printing head down onto the base in alignment with the printing devices supported on the base, as described more fully hereinafter.

The base 32 of the printing machine 31 is provided with a top cover 37 attached to a suitable rigid frame (not shown). The frame of the printing base also supports a form-mounting fixture 41. A printing station, indicated generally by the reference numeral 44, is located in the top central portion of the machine base 32. The printing station 44 is bounded by appropriate bracket and gauge members 46, 47, 48 and 49, each mounted upon the form-mounting fixture by appropriate means such as cap screws or other suitable fastening devices. The members 46, 47, 48 and 49 engage the edges of a form to be printed (not shown in the drawings) to retain the form in predetermined position at the printing station 44 of the machine.

The form-mounting fixture 41 may also be provided with a gauge member 51 having a pair of arms that extend toward two corner mounts 52 and 53 which project upwardly from the fixture 41. Thus, a small individual printing plate or similar printing device 54 may be retained in position between the ends of the arms of gauge 51 and the corner mounts 52, 53 to hold the printing device in fixed position in the printing station 44 of the machine.

The printing machine 31 may also provide means for mounting a second printing device 61 at the printing station 44. The printing plate 61 may be retained semi-permanently in the machine, and may comprise an embossed

or relief printing plate identifying the company making the same or an individual station within an overall credit sales system. A dating device 62 may be mounted at the printing station 44 immediately adjacent the semi-permanent printing plate 61.

The variable data imprinting apparatus in the machine 31 comprises a series of individual manually settable type devices comprising a plurality of individual type wheels 63 mounted on the base 32 of the machine at the right-hand edge of the printing station 44. Each of the type wheels 63 has a plurality of printing elements spaced about the periphery thereof; these printing elements may include both a numerical character and a corresponding code character where the sales or other record forms imprinted in the machine are subsequently to be read and interpreted by mechanized accounting apparatus. Each of the type wheels 63 is independently rotatable to position a pre-selected numeral or other type character for printing at the printing station 44.

Setting of the variable data in the printing machine 31 is accomplished by rotary setting of the type wheels 63. The means for setting the type wheels includes a control panel 64 and a plurality of keys 66 that are slidable within longitudinally extending slots 67 in the control panel. Each key 66 is operatively connected to a corresponding one of the type wheels 63 by a rack and pinion mechanism as described in greater detail in relation to FIGS. 2-4. The control panel 64 may be inscribed with appropriate reference characters alongside each of the slots 67 so that the desired numeral on any type wheel can be selected by positioning the connected key 66 opposite the intended numeral in the control panel. If desired, separate indicator means may be utilized to afford a direct indication of the numbers set on the type wheels at the openings 69 immediately above the control panel 64 in the machine.

The printing head 33 of the variable data recorder 31 comprises an exterior frame including a pair of side members 79 and 81 connected together by a U-shaped channel member 82. The two side members 79 and 81 are pivotally mounted upon the base of the machine as indicated by reference numeral 83.

The printing head 33 carries a platen that moves transversely across the printing station 44 to imprint all of the data from the type wheels 63 and the other printing devices at the printing station upon an appropriate record form interposed between the printing head and the printing devices. The platen preferably comprises a roller platen 86 of the porous ink-impregnated type. The roller platen 86 is rotatably mounted between the lower ends of the depending arms of a yoke 87 that is movable along the greater portion of the length of the channel member 82 constituting the frame of the printing head. The yoke 87 is connected to a housing 88 of a handle assembly that includes an upwardly projecting handle 89. The lower portion of the printing head 33 may be provided with a flexible mask 98 formed with appropriate openings corresponding to the printing elements on the base of the machine, including the printing devices 54 and 61, the dater 62, and the type wheels 63. The printing head may also be provided with appropriate means for latching the head in its lowered or printing position, as represented by the latch members 99, if desired.

The construction of the variable data imprinting apparatus of the printing machine 31 is shown in detail in FIGS. 2-5. With reference to FIG. 4, it is seen that the coded type wheels 63 are five in number, 63-1 through 63-5, and are disposed between two fixed frame plates 126 and 127. The frame plates are maintained in fixed spaced relation by a plurality of spacer rods 128. The type wheels are each rotatably mounted upon a shaft 129. The opposite ends of the shaft 129 are supported in the frame plates 126 and 127. The frame plate 127 is provided with a series of individual flange members 138 that are utilized to mount the variable imprinting apparatus frame in the base of the printing machine. In FIG. 4, the lugs or flange

members 138 have been cut away to show parts of the reset signalling apparatus of the present invention, as described more fully hereinafter.

Each of the coded type wheels 63 is provided with an integrally molded pinion gear that is smaller in diameter than the type wheel. One such gear 135-5 is seen in the elevation views comprising FIGS. 2 and 3. Each of the remaining type wheels is provided with a pinion gear like the gear 135-5.

The variable data recording apparatus further includes five individual rack members, 151-1 through 151-5, that are aligned with the gaps between the code wheels 63-1 through 63-5, as shown in FIG. 4. Each of the rack members 151-1 through 151-5 is provided with a plurality of gear teeth 150 formed on the upper edge thereof and engageable with the pinion gear of a respective code wheel. Thus, as shown in FIG. 2, the gear teeth 150 on the rack member 151-5 mesh with the teeth of the pinion gear 135-5 on the coded type wheel 63-5. The individual rack members 151 are provided with longitudinally extending guide slots 152 which co-act with a guide pin 153 mounted between the frame members 126 and 127 (FIGS. 2 and 4) to maintain the rack members in alignment. The left-hand end of each rack member 151, as viewed in FIGS. 2 and 4, is provided with a generally T-shaped lug 154 affording a convenient means to connect each rack member to one of the tabulator keys 66 (FIG. 1).

Each of the type wheels 63 has ten printing elements 170 formed on flat surfaces on the outer periphery thereof (FIGS. 2 and 3). Each of the flat printing surfaces 170 is spaced from the immediately adjacent printing element flats by a V-shaped detent-receiving recess 156 extending radially inwardly of the type wheel. As noted above, each of the flat printing elements may include a relief numerical character and, if desired, a corresponding code character. The uppermost printing element of each code wheel, as viewed in FIG. 2, bears the data to be imprinted upon a record sheet during the printing operation. That is, the uppermost type element is at printing position. By individually rotating the separate code wheels, using the racks 151, adjusted longitudinally by means of the tabulator keys 66, a series of type characters may be set at the printing station for printing a monetary amount or other variable data pertaining to a transaction.

As shown in FIGS. 4 and 5, a bail bar member 201 is mounted between the frame plates 126 and 127, and the mounting arrangement for the bail bar member 201 comprises two pairs of links 202 and 203. The links 203 are each pivotally mounted on a shaft 206 extending transversely of the frame 126, 127 and the links 202 are pivotally mounted on a similar shaft 204. The bail bar member 201 has a generally V-shaped nose portion 207 engageable with the recesses 156 in the code wheel 63. In its engaged position, as shown in FIG. 5, the nose portion 207 of the bail bar accurately aligns the type wheels at the printing position. A pair of coil springs 208 are incorporated in the alignment mechanism comprising the bail bar 201; each of the coil springs 208 has one end seated upon the bail bar member 201 and the other end engaged with a plate 209 extending between the frame members 126 and 127. The springs 208 bias the bail bar 201 toward the position illustrated in FIGS. 4 and 5 in which the nose portion 207 of the bail bar engages in the recesses 156 in the type wheels to give a positive and accurate alignment of the code wheels.

Cam and lever means are incorporated in the bail bar mechanism of the printing machine for moving the bail bar 201 to a retracted position permitting free rotation of the type wheels whenever the printing head of the machine is in the upper or non-printing position illustrated in FIG. 1. This cam and lever means comprises a cam 221 that rotates in response to pivotal movement of the printing head of the machine. Also included is a lever 212 that is pivotally mounted between the frame plates 126 and 127, the lower end of the lever 212 being engageable with the

bail bar 201. Upon pivotal movement of the printing head to its raised position, cam 221 is rotated into engagement with the upper end of the lever 212 and pivots the lever in a counterclockwise direction to retract the bail bar 201 and thus retract the nose portion 207 of the bail bar from the type wheel recesses 156. When the printing head is returned to its printing position, the springs 208 again cause the bail bar to engage the type wheels.

The variable data imprinting apparatus of the printing machine further includes pre-alignment bail member 250 that is pivotally mounted upon the spacer rod 128A immediately below the code wheels 63. The bail member 250 is generally channel-shaped and is provided with an upwardly extending bail or nose portion 252 (see FIGS. 2 and 3). This nose portion 252 of the bail member 250 extends across all of the rack members 151 and is aligned with a series of index elements, comprising the notches 253, formed in the lower surface of each of the rack members. On each rack member there is one index element 253 for each printing element 170 on the type wheel 63 with which the rack member is associated. Suitable spring means such as a spring 254 is provided to bias the bail member 250 into engagement with the rack members.

The end of the bail member 250 opposite the nose portion 252 terminates in a cam follower portion 255. Each of the two links 202 is provided with an extension portion 256, between which a cam member 257 is mounted in position to engage the cam follower portion 255 of the bail member 250. Each time the links 202 are rotated in response to pivotal movement of the printing head of the machine, as described above, elevating the printing head away from the base of the printing machine, the cam member 257 raises and engages the cam follower portion 255 of the pre-alignment bail 250, rotating the bail counterclockwise about its pivot 128A and disengaging the bail bar portion 252 of the bail 250 from the rack members 151. This releases the rack members, leaving them free for longitudinal movement to set a new monetary amount (or other variable data) in the variable data printing apparatus.

The basic construction of the printing machine 31, as thus far described, is essentially similar to that set forth in the above identified patent No. 3,138,091 to J. A. Maul; accordingly, only a brief review of the operation of the printing machine 31 is to be used, as in recording a sales transaction, the customer's credit plate or other similar personal printing device 54 is mounted in the machine as shown in FIG. 1. It may be assumed that the dater 62 has previously been set for the date upon which the transaction occurs. The machine operator then sets the monetary amount of the sale, or other valuable data pertaining to the transaction, in the printing machine. That is accomplished by setting the individual keys 66 to the various numerical values or other representations requisite to delineation of the data entailed. In adjusting the keys 66, the machine operator sets each of the individual settable type devices (each comprising a key 66, a rack 151, a gear 135, and a type wheel 63) to a particular position that presents a desired type character at the printing position immediately adjacent the printing device 54 (FIG. 1).

With the variable data apparatus of the printing machine thus set, a suitable recording form is placed in the printing machine and the printing head 33 is pivoted counterclockwise to printing position. The roller platen 86 is then moved transversely of the machine and makes the desired imprint from all of the printing devices of the machine, including the personal printing plate 54, the semi-permanent plate 61, the dater 62, and the type wheel 63.

At the conclusion of the complete imprinting motion, comprising the lowering of the printing head 33 and the transverse movement of the platen 86, the printing head is again pivoted to its inactive position as shown in FIG.

1 and the printed form is removed from the machine. For a subsequent transaction, the operator removes the printing device 54 if a new customer is involved, replaces it with another printing device, sets the individual type devices comprising the type wheels 63, utilizing the keys 66, to reflect the new transaction, and again proceeds with an imprinting cycle on a record sheet as described above.

Each time the printing head 33 of the machine is moved to its inactive position as shown in FIG. 1, the bail bar 201 is retracted from its engagement with the type wheels 63 (see FIG. 5) releasing the type wheels for free rotation to the next positions selected by the operator. Moreover, the pivotal motion of the links 202 upon which the bail bar 201 is mounted causes the cam member 257 to pivot upwardly from the position shown in FIG. 2, engaging the cam follower portion 255 of the pre-alignment member 250 and releasing that bail from the index elements 253 in the rack members 151. Thus, neither the bail bar 201 nor the pre-alignment bail 250 prevents free adjustment of the individual type devices comprising the type wheels 63 when the imprinting means of the machine, constituting the print head 33, is in its inactive or non-printing position.

Each time the print head 33 begins its imprinting motion, the bail bar 201 is released and returns, under the bias of the springs 208, toward engagement with the type wheels 63. Before the bail bar engages the type wheels, the resulting pivotal movement of the links 202 releases the pre-alignment bail 250 so that the nose portion 252 of that bail moves into engagement with the index elements of the rack members 151 and establishes an initial and approximately accurate alignment of the settable type devices. Thereafter, the nose portion 207 of the precision alignment bail 201 engages the type wheels and completes the alignment operation.

The printing machine 31 is provided with an alignment safety device 270 that is connected to the individual settable type devices comprising the type wheels 63 and that prevents an imprinting operation unless all of the type wheels 63 are accurately aligned at printing position. This alignment safety device, as best illustrated in FIGS. 2-4 and 6, comprises an extension member 203A for one of the links 203 upon which the precision alignment bar 201 is mounted. The extension member or lever 203A projects downwardly, then upwardly outside of the frame member 127 and terminates in a lug 271 located near the top of the frame member 127.

The lug 271 has an opening which receives one end of a draw link 272. The other end of the draw link 272 is pivotally connected to a crank 273, the crank 273 being pivotally mounted upon the printing machine as indicated by reference numeral 274 (FIG. 6). The free arm of the crank 273 terminates in a projecting stop lug 275 that extends upwardly from the crank arm. The connection between the draw link 272 and the lug 271 on lever 203A is not a rigid one. Rather, a compression spring 276 affords a resilient connection between these two members.

The operation of the alignment safety device 270 is effective to prevent a printing operation whenever any of the type wheels 63 is not accurately aligned in the desired printing position. Thus, if the type wheels hang up without being precisely aligned, the nose 207 of the bail member 201 cannot advance completely into the notch 156 in any type wheel that has not reached almost the desired precise rotational alignment. Under these circumstances, the bail member 201 cannot advance completely to the left to the position shown in FIG. 5, but is blocked at a position somewhat to the right of that shown. Accordingly, the one link 203 and the extension lever 203A connected thereto are held at a position to the right of that illustrated in FIG. 2. As a consequence, the connection from the lever 203A to the crank 273 provided by the draw link 272 holds the crank in the position illustrated in FIG. 6 with the stop lug 275 positioned

to interfere with lowering of the printing head to printing position. That is, the lug 275 on the crank 273 is held in a position where it engages the lower edge of the side frame member 81 of the printing head (see FIG. 1) and prevents the printing head from moving downwardly to a position where a printing operation may be completed.

In normal operation, all of the type wheels are accurately aligned as the bail member 201 slides home to the position illustrated in FIG. 5, the nose of the bail seats, and the link 203 moves to the leftward limit of its travel. The corresponding movement of the lever 203A attached to the link 203 drives the draw link 272 forwardly, pivoting the crank 273 in a counterclockwise direction as seen in FIG. 6 to a point where it is clear of the printing head and does not interfere with a printing operation. Accordingly, when all type characters are accurately aligned at the printing position, the alignment safety device 270 permits a full imprinting motion on the part of the imprinting means comprising the printing head 33. That motion is prevented only under unusual circumstances when one or more of the type wheels hangs up out of alignment.

The present invention comprises a reset signaling device 300, the preferred embodiment of which is best illustrated in FIGS. 2, 3 and 4. The reset signaling device 300 comprises a first or over-center lever 301 that is pivotally mounted on the frame member 127 as indicated by reference numeral 302. The lever 301 has a first elongated arm 303 of C-shaped configuration projecting to the left of the pivotal mounting 302. At the end of the arm 303, a type set sensing element or bail 304 is mounted on the arm 303. The sensing element 304 projects across the variable imprinting assembly underneath all of the rack members 151 and is engageable with the index elements on the rack members. This relationship is best illustrated in FIGS. 2 and 4.

The other end of the lever 301 comprises an arm 305 that terminates in a notch 306. The notch 306 is engaged by one end of an over-center leaf spring 307 mounted in a retainer plate 308 affixed to the frame member 127.

The arm 305 of the lever 301 is provided with an outwardly projecting lug 309. The outer end of the lug 309 supports a print sensing element comprising a rod 311. A loose rockable mounting is used to support the rod 311 on the lug 309. The sensing element, rod 311, projects upwardly through the frame 312 of the machine base and into the path of movement of the side plate 81 on the printing head 33, as shown in FIGS. 1 and 2.

The reset signalling device 300 further includes a second lever 314 that is pivotally mounted upon the frame plate 127 as indicated by reference numeral 315 (FIGS. 2-4). An intermediate point on the lever 314 is engageable with a pin 316 that is fixedly mounted upon the over-center lever 301. A spring 317, connected at one end to a pin 318 mounted upon the frame member 127 and at the other end to a pin 319 mounted on the lever 314, biases the lever 314 in a counterclockwise direction toward engagement with the pin 316.

The free end of the lever 314 carries an upwardly projecting rod 321 constituting a stop member. As in the case of the sensing rod 311, the connection between the rod 321 and the lever 314 preferably permits some rocking motion between the two. The stop member, rod 321, extends upwardly through the base frame member 312 at a location inwardly of the stop lug 275 on the alignment safety crank 273, as best shown in FIG. 6.

In considering operation of the signalling device 300, it may be noted that the device has two stable operating conditions; the first stable operating condition is illustrated in FIG. 2, and the second stable operating condition is illustrated in FIG. 3. Moreover, these two stable operating conditions are determined by the operating positions of the over-center lever 301, sometimes referred to hereinafter as the signalling member of the device.

Referring to FIG. 2, it is seen that with the signalling device 300 in its first stable operating condition, the signalling lever 301 is near the clockwise limit of its rotational travel, being held in stable position by the spring clip 307 and the engagement of bail 304 with the index elements 253. The signalling lever 301 has been driven to this position by downward movement of the print sensing element 311, which in turn has been driven downwardly by engagement with the side plate 81 of the printing head 33 in a previous printing operation (see FIG. 1). The downward position of sensing element 311, as shown in FIG. 2, is referred to hereinafter and in the claims as the second operating position for this sensing element. The type set sensing element comprising the bail 304 is in an initial position, at the uppermost limit of its travel, engaged with the indexing elements 253 of the type setting racks 151.

With the device 300 in this first stable condition, FIG. 2, the spring 317 holds the lever 314 at the counterclockwise limit of its travel and this in turn maintains the stop member 321 up above the frame 312 in an active position wherein it prevents counterclockwise rotation of the crank 273 (FIG. 6) and holds the crank in a position such that its stop lug 275 prevents lowering of the print head 33 to a position where a printing operation can be completed.

From the foregoing description, it can be seen that with the reset signaling device 300 in its first stable operating condition as shown in FIG. 2, the device gives a positive indication to an operator that the printing machine should be reset, with respect to the variable data presented by the settable type devices comprising the type wheels 63, in accordance with any new transaction. Consequently, the operator of the machine is clearly informed that a reset operation must be carried out before the next imprint can be taken in the machine.

When the operator of the printing machine resets one or more of the settable type devices comprising the type wheels 63, by manipulation of the keys 66, the reset signalling device 300 is actuated to its second stable operating condition as illustrated in FIG. 3. Thus, movement of any one of the racks 151, whether in a forward or backward direction, cams the type set sensing bail 304 downwardly from the position illustrated in FIG. 2 toward that shown in FIG. 3. The downward movement of the bail 304 pivots the signalling lever 301 in a counterclockwise direction. The over-center spring 307 completes the counterclockwise movement of the signalling lever 301 and holds the signalling lever in the second stable position illustrated in FIG. 3. That is, the signalling lever 301 is actuated to its second stable position, indicating that a printing operation may proceed, in response to displacement of the type set sensing element 304 from the initial position shown in FIG. 2 to the second position shown in FIG. 3.

The counterclockwise movement of the signalling lever 301 to the position illustrated in FIG. 3 moves the pin 316 down, pivoting the lever 314 in a clockwise direction against the bias afforded by the spring 317. As a consequence, the stop member 321 is moved downwardly from the active position illustrated in FIG. 2 to an inactive position, shown in FIG. 3, in which the stop member no longer interferes with pivotal movement of the crank 273 (FIG. 6). With the crank 273 free to rotate without interference from the stop member 321, and assuming that the type wheels 63 can be accurately aligned as is the case in all normal operations of the machine, there is no further interference with operation of the imprinting means comprising the print head 33.

The counterclockwise rotation of the signalling lever 301 also moves the print sensing element 311 upwardly to the position shown in FIG. 3. The print sensing element is now restored to its initial position and is ready to sense movement of the print head into printing position, indicating that a printing operation is taking place.

In the course of the actual printing operation, the print sensing element comprising the rod 311 is driven downwardly and restores the signalling device 300 to its first stable operating condition by pivoting the signalling lever to the position shown in FIG. 2. When this occurs, the stop member 321 cannot rise immediately because the crank 273 is located above the stop member while the printing operation is carried out. But when the printing operation is completed, and the print head is raised, the crank 273 is automatically restored to the FIG. 6 position by the draw link 272, in which it is clear of the path of stop member 321. Thereupon the spring 317 pulls the lever 314 and the stop member 321 back to the initial upward position shown in FIG. 2, blocking any further printing operation until the type wheels have been reset.

From the foregoing description, it can be seen that the second lever 314, pin 316 and spring 317, form, in effect a delayed action device which allows a restoration signal to be given to the stop member 321 at the time that the first lever 301 is restored, but such that the restoration will not finally take effect until the print head 33 has been raised. This is necessary to give the actual movement blocking member, namely crank 273, an opportunity to be restored to its blocking position, thereby clearing a path for the stop member 321 to move to its stopping position.

From the foregoing description, it will be apparent that the reset signalling device of the present invention is quite simple and inexpensive and does not add materially to the cost of the printing machine 31. Nevertheless, the device affords a positive signalling action which, in the present instance, positively interlocks the printing machine to prevent a second printing operation unless and until the variable data imprinting apparatus comprising the type wheels 63 has been reset in accordance with a new transaction, following an initial transaction. On the other hand, and despite the fact that the reset signalling device is quite automatic in operation, there is no necessity to return the settable type devices to zero or to any other home position. The over-center construction employed for the signalling device is particularly advantageous because it is cammed out of engagement with the setting racks used for the individual type wheels as soon as the operator starts a new setting operation. This materially reduces wear upon the indexing elements of the racks and upon the sensing member 304 that engages those indexing elements.

In constructing the reset signalling device of the invention, it is not essential to use the particular indexing elements 253 employed in the preferred embodiment in sensing the reset operation. Thus, in a given mechanism it might be more convenient to utilize the rack teeth 150 on the rack members for this purpose, depending upon availability of space within the base of the printing machine and other related factors. By the same token, the gear teeth on the individual pinion gears such as gear 135-5 (FIG. 2) can be employed as the indexing elements in the sensing of the reset operation. It will thus be apparent that the invention can be readily adapted to other forms of settable type devices as, for example, type devices in which the type wheel setting racks 151 are replaced by sector gears and are coupled to the type wheels through intermediate gear chains. Of course, the teeth on the intermediate gears in a device of this kind afford appropriate indexing elements that can be used for sensing reset operation in exactly the same manner as the bail 304 senses that operation in the above described embodiment.

By the same token, the invention is not dependent upon sensing of a pivotal motion of the printing head, insofar as the necessity of sensing the actual printing operation is concerned. The pivotally mounted print head 33 of the specific printing machine 31 described above affords a convenient arrangement for detecting the imprinting motion of the printing apparatus comprising the platen 86.

In a machine of the type in which the printing head is fixed and only the platen moves, however, the initial transverse movement of the platen itself can be sensed equally conveniently, resulting in operation no different in substance from that described above.

FIG. 7 illustrates a modified and simplified form of the present invention in which signalling is effected on a visual basis rather than by interlocking the actual printing mechanism. The signalling device 300A illustrated therein comprises a signalling lever 301A that is generally similar to the lever 301 and that is again pivoted on the side frame 127 of the machine as indicated by reference numeral 302. As before, the right-hand lever arm 305A carries the print sensing element or rod 311 that is engaged by the print head 33 of the machine during each printing cycle. Moreover, and as before, the right-hand end of the arm 305A of lever 301A is notched and is engaged by the over-center spring 307.

The left-hand arm 303A of the signalling lever 301A again carries the sensing bail 304 that engages the indexing elements 253 on the type setting racks 151 of the machine. In this respect, the arm 303A is essentially similar to the arm 303 described above. In this instance, however, the free end of the arm 303A of the signalling lever 301A is provided with a vertical extension 331 which projects upwardly through an opening 332 in the top cover 37 of the printing machine to expose a flag 334 to the view of the machine operator.

The reset signalling device 300A is not an interlocking device, as noted above. Consequently, in this device the stop lever 321 and the associated actuating lever 314, spring 317 and pin 316 are eliminated. These elements are replaced by the vertical extension 331 and the flag 334.

In FIG. 7, the device 300A is illustrated in a first stable condition generally corresponding to the first stable condition of the device 300 as illustrated in FIG. 2. Thus, the reset sensing bail 304 is in its initial position engaged with the indexing elements 253 of the type setting racks. The signalling lever 301A is at the clockwise limit of its rotational movement and is held there in a stable condition by the spring 307. The flag 334 projects upwardly into clear view of the machine operator and informs the operator that the printing machine should be reset for a new transaction prior to any further printing operation. As before, the reset signalling device 300A and particularly the signalling lever 301A are driven to this position as the result of a prior printing operation in which the print sensing element 311 is driven downwardly to its second position, as illustrated.

When the machine operator resets any one of the type wheels by movement of the associated type rack, the sensing bail 304 is driven downwardly far enough to cause the signalling lever 301A to move to its second stable position, the movement being completed by action of the over-center spring 307. That is, actuation of the type set sensing element 304 from its initial position as shown in FIG. 7 to its second position (corresponding to that shown in FIG. 3) pivots the signalling lever 301A in a counterclockwise direction to a second stable position. In the second stable position of the lever 301A, the flag 334 is pulled beneath the cover of the machine, signalling the machine operator that the machine is ready for a printing operation. At the same time, the counterclockwise rotation of the lever 301A lifts the print sensing element 311 up to a position to be engaged by the printing head of the machine and thus prepares the device for sensing of the next printing operation.

It will be recognized that other forms of signalling could also be used with the present invention. For example, actuation of the signalling lever from one stable condition to another can be employed to actuate appropriate switches for energizing signal lights to inform the machine operator whether the printing machine is ready for a printing operation or requires re-setting. Other forms of visual or tactile signals can also be employed.

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.

What is claimed is:

1. In a variable data printing machine of the kind comprising a plurality of individual type devices each settable to a plurality of different positions to present different type characters at a printing position and each including a plurality of spaced index elements aligned with similar index elements of the remaining type devices whenever said type devices are set for a printing operation, and imprinting means movable in a predetermined direction along a predetermined path in association with an imprinting operation of the machine to imprint a recording sheet engaging said type characters, a reset signalling device comprising:
 - a print sensing element interposed in said path and displaceable from an initial position to a second position each time said imprinting means moves in said predetermined direction along said path;
 - a type set sensing element engaging said index elements and displaceable from a first position to a second position whenever one of said type devices is set to a different type setting;
 - and a bi-stable signalling device including a lever associated with both of said sensing elements, said lever being actuatable upon displacement of said print sensing element to its second position to a first stable position indicating that a printing operation should not proceed without resetting of the type devices, and being actuatable upon displacement of said type set sensing element to its second position to a second stable position indicating that a printing operation may proceed;
2. In a variable data printing machine of the kind comprising a plurality of individual type devices each settable to a plurality of different positions to present different type characters at a printing position and each including a plurality of spaced index elements aligned with similar index elements of the remaining type devices whenever said type devices are set for a printing operation, and imprinting means movable in a predetermined direction along a predetermined path in association with an imprinting operation of the machine to imprint a recording sheet engaging said type characters, a reset signalling device comprising:
 - a print sensing element interposed in said path and displaceable from an initial position to a second position each time said imprinting means moves in said predetermined direction along said path;
 - a type set sensing element engaging said index elements and displaceable from a first position to a second position whenever one of said type devices is set to a different type setting;
 - an alignment safety device, connected to said type devices, for preventing an imprinting operation of said machine except when all type characters are accurately aligned at said printing position;
 - a bi-stable signalling device associated with both of said sensing elements, actuatable upon displacement of said print sensing element to its second position to a first stable position indicating that a printing operation should not proceed without resetting of the type devices and actuatable upon displacement of said type set sensing element to its second position to a second stable position indicating that a printing operation may proceed;

and means interconnecting said signalling device and said alignment safety device to actuate said safety device to prevent an imprinting motion of said imprinting means whenever said signalling member is in said first stable position.

3. In a variable data printing machine of the kind comprising a base, a plurality of individual type devices, mounted side-by-side on said base and each including a type wheel settable to a plurality of different positions to present different type characters at a printing position, each type device further including a pinion gear mounted on said type wheel and engaged by a rack member having a plurality of spaced index elements aligned with similar index elements on the rack members of the remaining type devices whenever said type devices are set for a printing operation, and imprinting means comprising a printing head pivotally mounted on said base and movable between an inactive position displaced from said base and a printing position adjacent said base at which said imprinting means is effective to imprint a recording sheet engaging said type characters, a reset signalling device comprising:

a print sensing element mounted on said base and displaceable from an initial position to a second position each time said print head moves to said printing position;

a type set sensing element engaging said index elements and displaceable from a first position to a second position whenever one of said rack members is moved to set its type wheel to a different type setting;

a bi-stable device associated with both of said sensing elements, actuatable upon displacement of said print sensing element to its second position to a first stable position indicating that a printing operation should not proceed without resetting of the type devices and actuatable upon displacement of said type set sensing element to its second position to a second stable position indicating that a printing operation may proceed;

and stop means, operatively connected to said bi-stable device for positively preventing movement of said printing head from its inactive position to its printing position whenever said bi-stable device is in its first stable position.

4. In a variable data printing machine of the kind comprising a plurality of individual type devices each settable to a plurality of different positions to present different type characters at a printing position and each including a plurality of spaced index elements aligned with similar index elements of the remaining type devices whenever said type devices are set for a printing operation, and im-

printing means movable in a predetermined direction along a predetermined path in association with an imprinting operation of the machine to imprint a recording sheet engaging said type characters, and with a return motion in a reverse direction along said path to a restored position, a reset signalling device comprising:

a print sensing element interposed in said path and displaceable from an initial position to a second position each time said imprinting means moves;

a type set sensing element engaging said index elements and displaceable from a first position to a second position whenever one of said type devices is set to a different type setting;

a bi-stable signalling device including a bi-stable member associated with both of said sensing elements, said member being actuatable upon displacement of said print sensing element to its second position to a first stable position indicating that a printing operation should not proceed without resetting of the type devices, and being actuatable upon displacement of said type set sensing element to its second position to a second stable position indicating that a printing operation may proceed;

said signalling device further including stop means including a stop member associated with said bi-stable member and movable from an inactive position to an active position in response to movement of said lever to its first stable position, said stop means interfering with and preventing said motion of said imprinting means until said stop member is restored to inactive position; and

a delayed action mechanism forming a portion of said stop means and permitting the actuation of said bi-stable member to its first position before the return motion of the imprinting means occurs.

5. A variable data imprinting machine as set forth in claim 4 in which the delayed action mechanism comprises a lost motion connection between the bi-stable member and the stop member, and resilient means urging the stop member into driving relationship with the bi-stable member in one direction.

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