

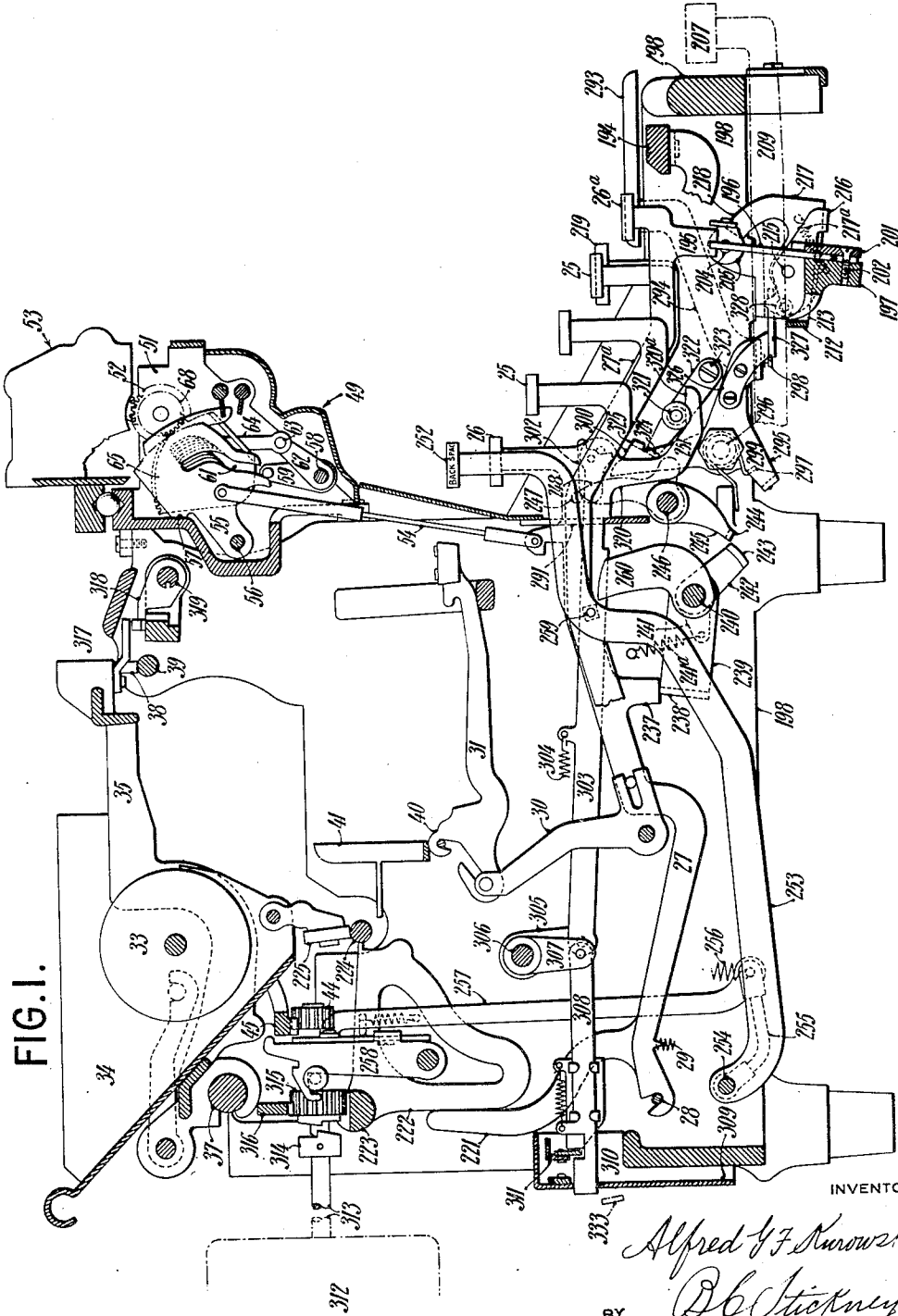
Aug. 7, 1934.

A. G. F. KUROWSKI

1,968,894

COMBINED TYPEWRITING AND COMPUTING MACHINE

Original Filed March 12, 1926 4 Sheets-Sheet 1



INVENTOR:

Alfred G F Kurowski

BY *Ob Stuckney*
ATTORNEY.

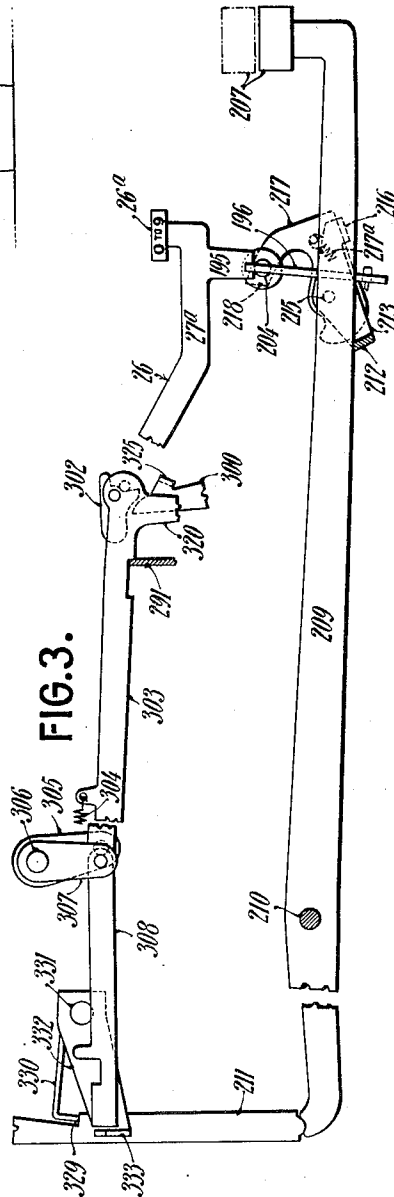
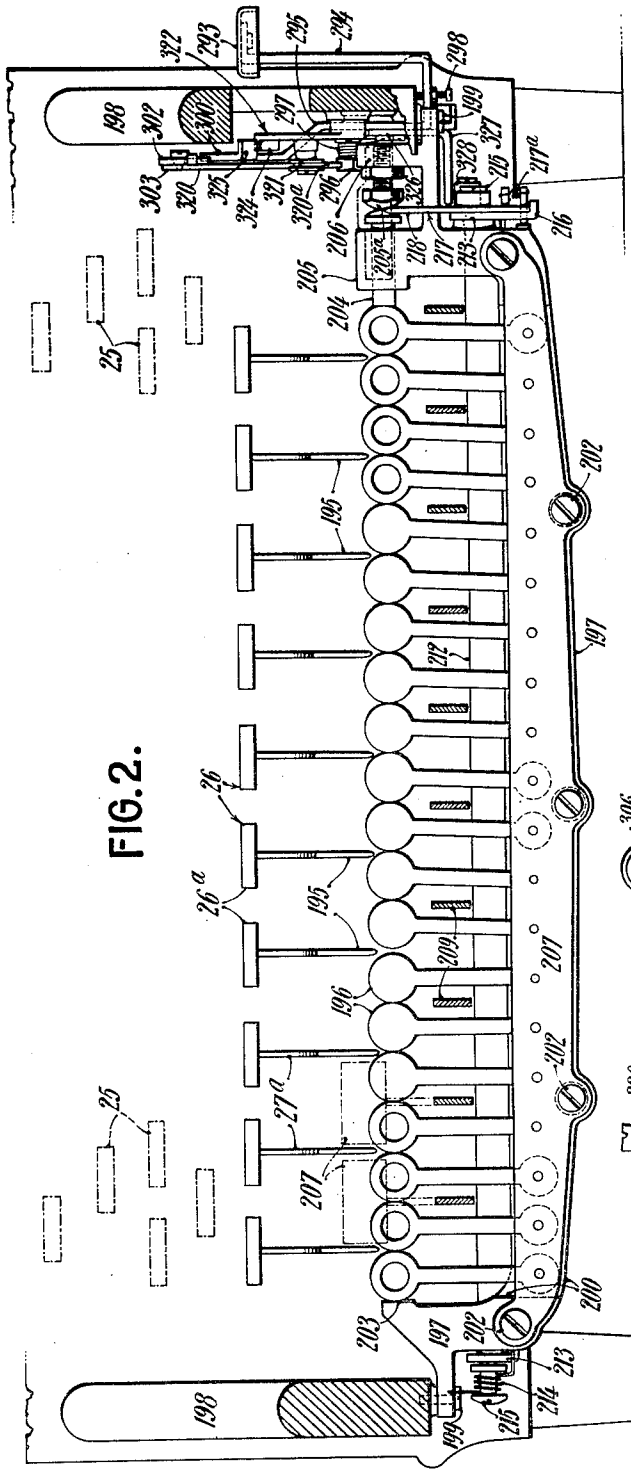
Aug. 7, 1934.

A. G. F. KUROWSKI

1,968,894

COMBINED TYPEWRITING AND COMPUTING MACHINE

Original Filed March 12, 1926 4 Sheets-Sheet 2



INVENTOR:

Alfred G. Kurowski

BY

B. B. Hickney

ATTORNEY.

Aug. 7, 1934.

A. G. F. KUROWSKI

1,968,894

COMBINED TYPEWRITING AND COMPUTING MACHINE

Original Filed March 12, 1926 4 Sheets-Sheet 3

FIG. 4.

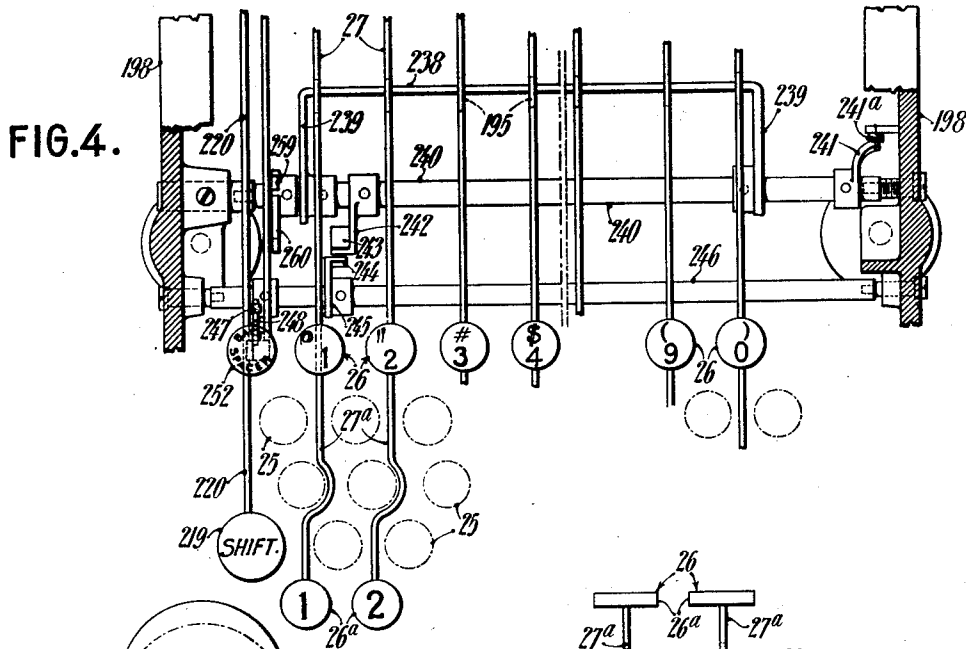


FIG. 5.

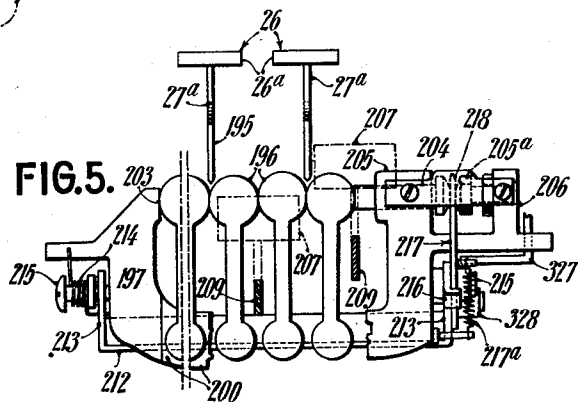
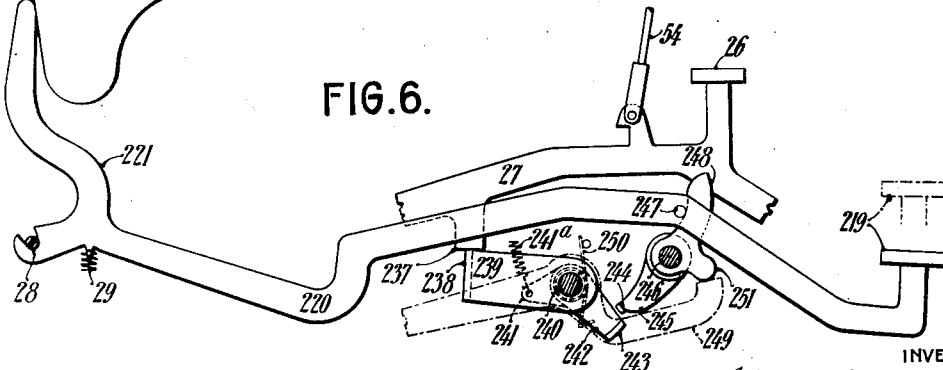


FIG. 6.



INVENTOR:

Alfred G. F. Kurowski
BY O. B. Hickney
ATTORNEY.

Aug. 7, 1934.

A. G. F. KUROWSKI

1,968,894

COMBINED TYPEWRITING AND COMPUTING MACHINE

Original Filed March 12, 1926 4 Sheets-Sheet 4

FIG. 7.

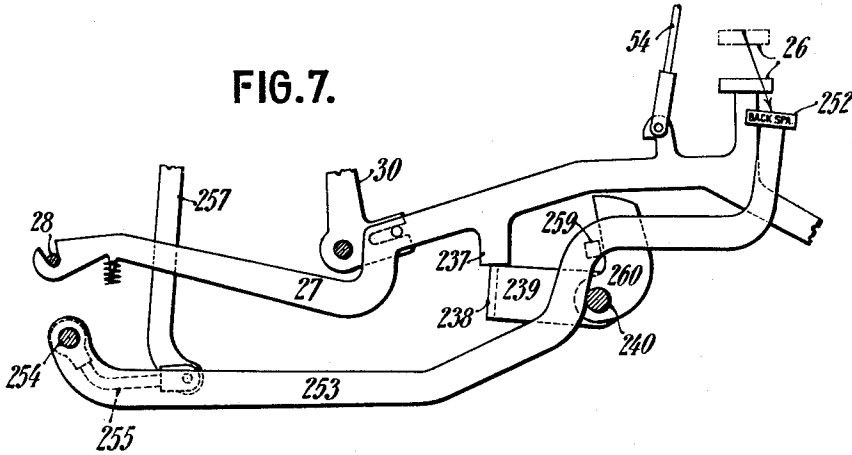


FIG. 8.

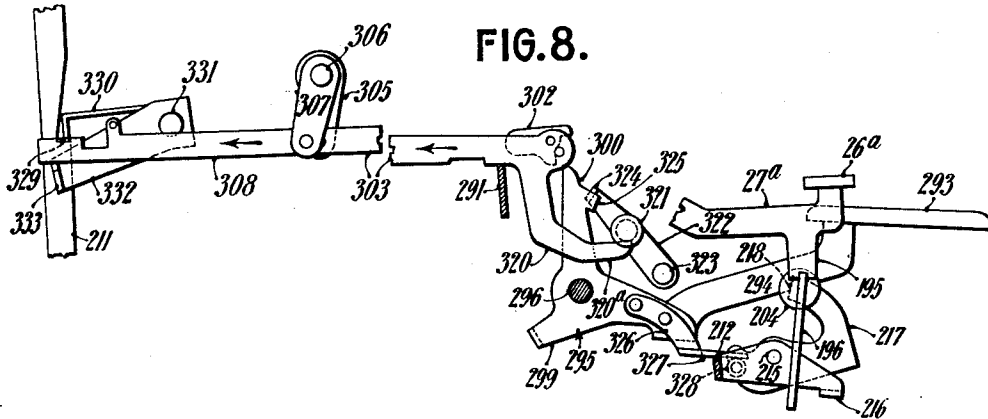
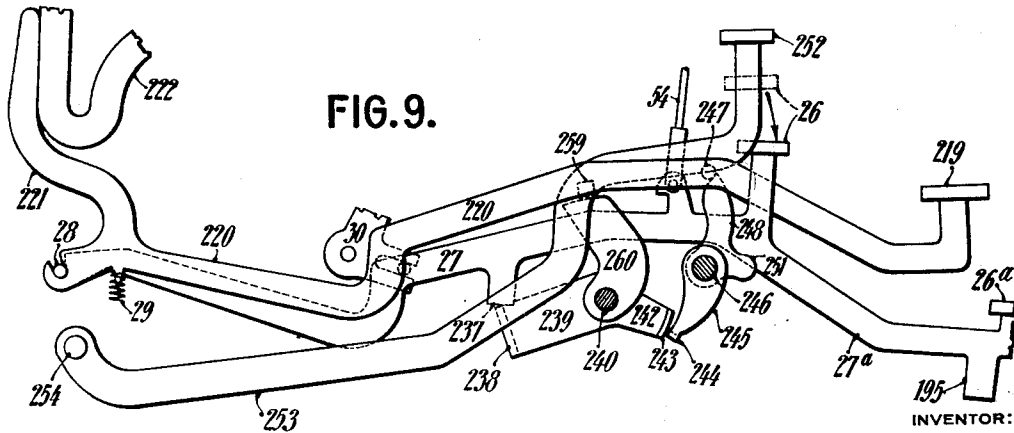


FIG. 9.



INVENTOR:

Alfred G F Kurowski
BY *B. B. Stickney*
ATTORNEY.

UNITED STATES PATENT OFFICE

1,968,894

COMBINED TYPEWRITING AND COMPUTING MACHINE

Alfred G. F. Kurowski, Brooklyn, N. Y., assignor
to Elliott-Fisher Company, New York, N. Y., a
corporation of Delaware

Original application March 12, 1926, Serial No.
94,181. Divided and this application November
11, 1930, Serial No. 495,064

17 Claims. (Cl. 235—130)

This invention relates to combined typewriting and computing mechanisms, and more particularly to that class of combined machines where a stationary actuator mechanism is operated by the numeral-keys of a typewriter in typing a numeral and registering serially the numbers typed within a totalizer movable with the typewriter-carriage step by step through a computing zone, and the present invention may be regarded as an improvement upon my pending application, Serial No. 74,698, filed December 11, 1925 (now Patent No. 1,835,165, dated December 8, 1931), and also as an improvement on the two patents to John C. Wahl, Nos. 893,718 and 893,719, dated July 21, 1908.

A feature includes a safety-key-locking means to prevent a joint operation of two computing actuator-devices by applying the safety interlocking members under the numeral-key-levers adjacent the position of their keys, and thus arrest a struck key at the seat of the impact before it has transmitted motion to a totalizer-actuator part. The safety locking means include a series of floating vertically-disposed members having a serial endwise contact between fixed stops at each end with sufficient looseness, as a series, to permit the passage of a single key-lever therebetween and check the passage of the second key-lever until the first key-lever has been withdrawn.

The Underwood typewriting machine provides carriage-controlling devices that include a case-shift mechanism, a back-spacing mechanism, a denominational tabulating mechanism and a power-driven carriage-return and automatic line-spacing mechanism. These mechanisms are all key-actuated, and to prevent the accidental depression of these keys during a computing operation, safety means are provided, so that, during the actuation of any numeral-key in computing, these several key-actuated mechanisms are all locked and rendered inoperative. Thus, at the initial depression of the numeral-key to compute, the case-shift key is locked, and it will be impossible to accidentally or otherwise type a character other than the numeral that enters into the computation. Similarly, the back-space key is locked, making it impossible to change the denominational letter-space position to which the totalizer is set to a higher denominational position, and the locking of the tabulator-keys prevents the totalizer being shifted to lower denominational positions, and the accidental depression of the carriage-return key during a computing depression of a numeral-key might result in serious

injury, or even in fracturing some of the operating parts. Locking these several parts by the initial actuation of any numeral-key to compute, renders all the carriage-controlling mechanisms proof against accidental operation or misuse.

This is a division of my application, Serial No. 94,181, filed March 12, 1926 (now Patent No. 1,876,696, dated September 13, 1932).

Other features and advantages will hereinafter appear.

In the accompanying drawings,

Figure 1 is a vertical section looking from the left-hand side of an Underwood standard typewriting machine, showing the power-driven carriage-return mechanism, case-shifting mechanism, back-space mechanism, and the key-locking means under the keyboard variously actuated by these mechanisms.

Figure 2 is an enlarged front elevation, showing in detail the manner of locking nine numeral-keys when the tenth key is depressed to fill up the gap shown between a series of floating members, and also showing other parts co-operative with the carriage-return key to prevent the actuation of any numeral-key by closing up this open key-gap during the power-driven carriage-return movement.

Figure 3 is a skeleton view, showing how the depression of any tabulator-key operates to lock the numeral-key, and also prevents the actuation of the carriage-return key until the tabulator-key is released.

Figure 4 is a top plan view of the extreme right and left hand portions of the keyboard, showing the manner of securing the several associated parts including rock-shafts, to the two side walls of the frame.

Figure 5 is a front view of the extreme right and left hand portions of Figure 2, showing a tabulator-key depressed and the numeral-keys locked by the filling up of the gap between the floating members.

Figure 6 is a skeleton view, showing the case-shift key depressed, the platen raised to the upper-case position, with safety interlocking means to prevent actuation of a numeral-key until the shift-key has been depressed for a full down-stroke against its fixed stop.

Figure 7 is a skeleton view, showing the back-spacing key depressed with interlocking safety connections to prevent the actuation of a numeral-key until the back-space key is restored to normal position.

Figure 8 is a skeleton view, showing the carriage-return key depressed to close the circuit to

the carriage-driving motor, and interlocks established to prevent the actuation of any numeral-key, shift-key or back-space key during the interval the carriage-return mechanism is operative.

Figure 9 is a skeleton view of a depressed numeral-key, and the interlocking parts moved into positions to intercept the depression of the case-shift-key, the back-space key and the tabulator-keys until the numeral-key has been restored to its normal position.

The Underwood standard typewriting machine includes alphabet-keys 25 and numeral-keys 26 to operate key-levers 27 extending rearwardly in parallel planes to engage a fulcrum wire 28 under the influence of individual recoil springs 29. Each key-lever is connected to vibrate a bell-crank 30 whose upper end is pivotally connected to a type-bar 31 hung upon a fulcrum wire 32 to be vibrated upwardly and rearwardly against the front face of a platen 33 mounted within a platen-frame 34 carried by a carriage 35 and rotatable step by step line-space distances by the usual line-spacing mechanism (not shown). The carriage 35 at the rear is mounted upon a carriage-rail 37, and the front side thereof is supported by a roller 38 which rolls upon a stationary rod 39 carried by the frame. Each type-bar is formed with a heel 40 to engage with a curved universal bar 41 forming part of the usual escapement mechanism, including the usual escapement dogs (not shown) that control the movement of a pinion 44 which is in mesh with a feed-rack 45 carried by arms pivotally connected to the platen-frame ends. The carriage 35 is propelled leftward, or in a letter-space direction, by the usual spring drum (not shown).

The computing mechanism includes an actuator 49 having a back bar 50 and ends 51 secured as a unit to the front of the typewriter-frame just over the keyboard, and includes mechanism for driving a master-gear 52 to actuate one or more computing heads or totalizers 53 carried by the typewriter-carriage. The master-gear 52 is connected to be operated by the numeral-keys 26 through distances that vary according to the digital values of the keys. To this end, each numeral-key-lever 27 is connected by a link 54 to an actuating cam-device 55 pivotally mounted as a series upon a shaft 56 supported by the two actuator-frame ends 51. Each cam-device 55 has a stop-face 57 to normally bear against the face of the back bar 50. Upon the depression of a numeral-key, the associated actuating cam-device 55 is swung downwardly about the shaft 56 to actuate a rock-shaft 58 through the medium of arms 59, which are fixed upon said shaft 58 and are held in operative engagement with their cam-devices 55 by a spring (not shown). The rock-shaft 58 is provided with a series of these arms 59, one arm being associated with each cam-device 55, and the cam-slots 61 therein varying in shape and operative sweep, as indicated at Figure 1, to rock the shaft 58 differentially through varying angular distances. The differential movements of the rock-shaft 58 are transferred to the master-gear 52 through a train of connections including a pair of crank-arms 62 fixed upon the rock-shaft 58 parallel to each other, the free ends thereof being connected by a stud 63 arranged to provide a pivotal bearing for a link 64, which is pivotally connected to a gear-sector 65 mounted to swing upon a suitable stud secured between two intermediate partition plates (not shown) which are secured to the back bar 50.

The sector 65 normally engages with a pinion

68. The master-gear 52 is normally disconnected from the pinion 68, but, during the initial depression of any numeral-key, said pinion 68 is operative to drive the master-gear 52 through the medium of a clutch mechanism (not shown).

Each numeral-key-lever 27 is formed with a forward extension 27^a, to provide for a second row of numeral-keys 26^a between the lower bank of character-keys 25 and a space-bar 194, and to provide an upper bank of keys for typing numerals, and a lower bank for typing and computing numerals, as set forth in my pending application, Serial No. 74,698, referred to. Each numeral-key-lever 27 is formed with a depending tongue 195 positioned to pass between two of a series of cam-elements 196. Referring to Figure 2, the means for suspending the cam-elements 196 includes a yoke-piece 197, secured to the lower edge of each machine side wall 198 by screws 199 to form a bridge across the keyboard. The yoke 197 may be in the form of a casting with a recess 200 formed by machining away the front vertical face of the yoke, and securing a cover-plate 201 thereover as by a series of screws 202 threaded into the front face of the yoke, the recess and plate forming a long pocket or channel within which the lower ends of the cam-elements 196 may be pivotally hung in vertical relation to each other, the side walls of the channel serving as guide faces to hold the cams in uniform vertical planes. The upper ends of these cams are circular in form and have a continuous side edge contact, as a series, between a fixed abutment 203, at the left-hand side of the yoke 197, and a right-hand abutment against a plunger 204 horizontally slidable through a lug 205 of the yoke, with a working space between the series of cams to permit the passage of the tongue 195 of a single numeral-key-lever. This working gap is made adjustable by a set-screw 205^a threaded into an adjacent lug 206 in the yoke, to abut the outer end of the plunger 204.

In prior combined typewriting and computing devices, the preventive interlocks for the numeral-keys are assembled within the actuator, and the depression of a second numeral-key before a depressed key has been fully restored will cause the parts intermediate the key-lever and the interlocks to be sprung and subjected to an undesirable strain. Positioning the preventive means directly under the point of finger-impact at the keyboard, checks the impact before any movement can be transmitted to the actuator.

A machine of this character is usually supplied with denominational tabulating means operated by keys 207, positioned outside a front bar 208 of the frame and provided with levers 209 fulcrumed at 210 with their rear ends arranged to lift a stop-bar 211 into the path of a carriage-stop, not shown. When said keys are depressed, as shown at Figures 2 and 3, the levers 209 pass rearwardly between the cams 196 to rest upon a universal bar 212 extending under the whole series of levers 209, with their free ends bent at right angles to form side arms 213, which are pivoted to the outer faces of the yoke 197 and held raised against the levers 209 by a spring 214 coiled about one of two pivot-screws 215. The right-hand arm 213 is formed with a bent-over ear 216 to underlie the lower edge of a cam-lever 217 hung upon one pivot-screw 215, and having a tongue 218 radially aligned between the head of the plunger 204 and the head of the set-screw 205^a to fill up the gap between the series of cams 196. To promote a ready entrance of the tongue

218, the adjacent edges of the head of the plunger 204 and the head of the set-screw 205^a may be beveled off, as shown. Thus when the denominational tabulating key is depressed to release and tabulate the carriage, the universal bar 212 will be swung to the position in Figure 3, and when the tongue 218 has passed between the fixed abutment of the screw 205^a and the head of the plunger 204 to close up the gap in the cams 196, the depression of any numeral-key is prevented, as shown at Figure 5, until the tabulating key 207 is fully restored and the tongue 218 withdrawn from the gap as by a suitable spring 217^a. Similarly, if a numeral-key-lever 27 is depressed, the gap between the cams 196 will be closed, and the depression of a tabulating key 207 will be prevented because of the inability of the tongue 218 to pass between plunger 204 and set-screw 205^a.

For the purpose of the present invention, a standard shift-key 219 is carried by a key-lever 220 pivoted to the rod 28 and formed with a crank-arm 221 engaging a frame 222 that swings with a rock-shaft 223 pivoted in the frame-ends. This frame 222 carries a rail 224 upon which a center roll 225 of the platen-frame rides in both upper and lower case positions.

To prevent the actuation of a numeral-key 26 during the down stroke of the shift-key 219, or to prevent the depression of the shift-key during the actuation of the numeral-key to type or compute, each numeral-key-lever 27 has a lug 237 at the under edge, to engage with a universal bar 238 formed with turned-over ends 239, and is secured to a rock-shaft 240 having a bearing in the frame sides. The shaft 240 has a crank-arm 241 provided with a spring 241^a that holds the universal bar 238 against the lower faces of the lugs 237 under tension. An arm 242 secured to the shaft 240 formed with a turned-over end 243 vibrates with the shaft to clear a turned-over end 244 of an arm 245 secured to a rock-shaft 246. The shaft 246 may be rocked by a stud 247 on the shift-key-lever 220 to engage a cam-arm 248 fixed to the shaft 246. To maintain the arm 248 against the stud 247 in all positions of the key-lever 220, a lever 249 mounted for a free movement upon the shaft 240 is provided with a spring 250 to raise the forward end thereof to abut a short arm 251 forming a part of the cam-arm 248. The depression of the numeral-key vibrates the universal bar 238 to rock the shaft 240 to vibrate the arm 242 that just clears the turned-over end 244, as shown at Figure 6, and should depression of the shift-key 219 be attempted during the prior depression of a numeral-key, such attempt will be checked because the rocking of the shaft 246 will be checked through the blocking of the arm 245 by the turned-over end 243, as shown in Figure 9. The normal depression of the shift-key 219 initially vibrates the turned-over end 244 of the arm 245 across the path of the turned-over end 243 of the arm 242, to prevent the depression of the universal bar 238 by a numeral-key until the shift-key has completed its down stroke at which time the obstructive face of the turned-over end 244 will have passed inside of the sweep of the end 243 as in Figure 6. This prevents operation of a numeral-key for upper-case writing until the shift-key is fully depressed.

A back-spacing key 252 is carried by a lever 253 secured to a rock-shaft 254 that carries a center crank-arm 255 lifted by a spring 256 and having a connection 257 to the well-known back-spacing device 258 that operates to back-space

the carriage in the usual Underwood manner. It is desirable to prevent any back-spacing operation during the manipulation of the numeral-key to type and compute. To this end, the lever 253 has a stud 259 at the side thereof to normally clear an arm 260 fixed to the shaft 240. When the back-spacing key is depressed, as at Figure 7, the stud 259 is swung downwardly to a position to intercept a swinging movement of the arm 260 and the rock-shaft 240, to prevent actuation of the universal bar 238 by a numeral-key 26. With the arm 260 positioned as at Figure 9, by a depressed numeral-key and the rocking of the shaft 240 by the universal bar 238 to swing said arm 260 under the stud 259, actuation of the back-spacing key is prevented, and the end 243 of the arm 242 is also swung to intercept a swinging movement of the arm 245, and thus prevent the depression of the shift-key 219.

It is a desirable feature in a combined machine of this character to include means operable by the keyboard to effect a power-driven carriage-return movement that automatically line-spaces the platen, and thereby enables the operator to have full and complete control of the carriage without removing the hands from the keyboard. To this end, see Figures 1, 2 and 8, a carriage-return-key 293 may be arranged outside the right-hand side of the frame, and includes a lever 294 that extends downward to pass under the lower edge of the frame, as by being bent at right angles to form a U-shaped loop with an inside section 295, pivotally hung upon a screw 296 and held in a normal position by a spring 297, the action of the spring being checked by a stop-screw 298 in the lever 294 to strike the under edge of the frame. To check the downstroke of the key 293, an arm 299 of the section 295 is bent over at right angles so that the free end may pass under the lower edge of the frame and contact therewith to limit the movement of said key. The section 295 is formed with an upright arm 300 arranged to engage with a trip-pawl 302 to raise the end of a rearwardly-extending bar 303 out of interlocking engagement with a comb-plate 291, to release said bar 303 to the action of a spring 304. The rear end of the bar 303 pivotally hangs from a crank-arm 305, depending from a rock-shaft 306 having end bearings in the frame. The rocking of the shaft 306 by the release of the bar 303 effects a rearward swing of a crank-arm 307 depending from said shaft with the end connected to a horizontally movable shift-bar 308 having its outer free end supported by a wall 309 of a switch-box 310. The rearward movement of the bar 308 vibrates a switch-arm 311 to close an electric circuit to a motor 312, operating to drive a shaft 313 and clutch-elements 314, to rotate a pinion 315 in engagement with a rack 316 carried by the carriage 35 to mechanically restore the carriage rightward for a new line of print. At the end of this rightward movement of the carriage, suitable trips 317 and 318, one carried by the carriage, and the other mounted upon a rock-shaft 319 on a frame, and suitable connections between the two rock-shafts 319 and 306 effect a forward movement of the bar 308 to open the switch 311, and effect a forward movement of the bar 303 to restore its interlock with the plate 291. Further details of the power-driven carriage-return and connections are shown and described in my Patent No. 1,679,727, dated August 7, 1928. The present invention is concerned only with the key-

actuated means to control the movement of the bar 303.

Figure 8 shows the key 293 depressed, the arm 300 swung forwardly, and the bar 303 lifted from the plate 291 and drawn rearwardly by the spring 304, to rock the shaft 306 and jointly effect the closing of the motor-circuit and lift the trip 318 into the path of the carriage-trip 317. The bar 303 has an extension 320 that terminates in a horizontal tongue 320^a parallel with the bar, to engage a groove in a stud 321 fixed to an arm 322 fulcrumed at 323 to the side frame. The free end of the arm 322 is bent over at right angles toward the arm 300, as at 324, and said arm 300 also has a bent-over end, as at 325. When the arm 300 swings forward from the position of Figure 1, the end 325 moves forward, and as this forward movement progresses, the bar 303 is lifted from the plate 291, which raises the extension 320 to lift the stud 321 and cause the bent-over end 324 to pass to the rear of the end 325 to interlock therewith, and prevent a restoring movement of the key 293 when the operator's finger is withdrawn, said key in its depressed position being used to lock the other keys during the carriage-return operation.

It is desirable therefore that the depression of the key 293 shall co-operate with the cams 196 and prevent actuation of the numeral-keys, back-space key, or the case-shift key during the power-driven carriage-return movement. To this end, the section 295 of the lever 294 has an arm 326 secured to the face thereof having a tongue 327 formed at right angles thereto, to provide a flat face to bear upon a roller 328 carried by the lever 217, and when the key 293 is depressed the lever 217 is swung about its pivot-screw 215 to swing the tongue 218 between the two members 204 and 205^a, to fill the working space between the series of cams 196 to prevent the actuation of any numeral-key, as shown at Figure 5.

It will be remembered that the depression of a tabulator-key 207 effects a locking-up of the keyboard by also vibrating the lever 217 to fill up the working gap within the cams 196, but the depression of a key 207, as shown at Figure 3, would not prevent the simultaneous depression of the carriage-return-key 293, which might result in injury to the carriage-stops, or other parts of the machine, and while the carriage-returning key-lever 294 might have suitable connections to co-operate with the cams 196, like the numeral-keys, in the present instance a simple connection is shifted by the tabulator-key to prevent the closing of the motor-circuit, and the depression of the key 293 becomes ineffective. As shown at Figure 3, each tabulator-stop-bar 211 is cut away at one edge to form a one-way notch 329, to engage with a universal bar 330 hung upon a fixed fulcrum rod 331, and formed with side arms 332 with one free end bent outward to serve as an abutment-stop 333. With the several parts positioned as shown at Figure 1, the end of the bar 308 that projects beyond the wall 309 of the switch-housing will pass over the stop 333, when the key 293 is depressed to start the motor, and the tabulator-key is locked up through the abutment of the stop 333 of the universal bar against the lower edge of the projecting bar 308. When the tabulator-key is depressed, as at Figure 3, the stop 333 is raised to intercept the rearward movement of the bar 308, and no carriage-return movement can take place.

It will be particularly noted that the depression of a numeral-key automatically prevents a de-

pression of the back-space key, the case-shift key, the tabulator-keys and the carriage-return key; that the depression of any tabulator-key prevents the depression of a numeral-key, or the actuation of the carriage-return key; that the depression of the carriage-return key automatically locks the numeral-keys and prevents the depression of a tabulator-key; and that, with a keyboard surrounded by such extensive interlocking safety and preventive devices, mistakes in manipulation of the keys that are liable to tangle up the computing mechanism are largely eliminated.

Variations may be resorted to within the scope of the invention, and portions of the improvements may be used without others.

Having thus described my invention, I claim:

1. In a typewriting machine including a carriage and a platen, the combination of a computing mechanism, including a totalizer carried by the carriage and actuated by a master gear within a computing zone, said master gear being driven by cam-actuators connected to a row of numeral-keys, key-actuated mechanism to back-space the totalizer within the computing zone, key-actuated mechanism to case shift the platen within the computing zone, a universal bar arranged parallel with the row of numeral-keys and actuated by each numeral-key to rock a shaft to which the universal bar is fastened, and means carried by the shaft and movable therewith by the universal bar to lock the back space and shift keys to prevent a back-spacing movement of the totalizer or a case-shifting movement of the platen during the movement of a numeral-key to compute, said means and the back space and shift keys being arranged so that upon depression of the back space key the numeral-keys are locked by the universal bar but are not locked when the platen has been case shifted.

2. In a typewriting and computing machine, the combination of a computing mechanism including a horizontal row of spaced numeral-keys, a typewriting mechanism including a horizontal row of tabulator-keys arranged in a bank below and spaced between the spacing of the numeral-keys, a horizontal train of separable numeral-key arresters arranged end to end under the numeral-keys so that each numeral-key will have a pair of spreadable arresters, each arrester formed with a narrow stem to clear an adjacent underlying tabulator-key, a horizontal frame underlying the tabulator-keys and to which the lower end of each arrested is pivoted, a universal bar mounted upon said frame, and a cam-spreader on said frame movable with said universal bar when each tabulator-key is depressed to prevent the spreading of the arresters by any numeral-key.

3. In a computing machine having a traveling totalizer, the combination with a series of laterally-spaced numeral-key levers, a computing mechanism operable thereby, and a back-space key-lever alongside the numeral-key levers and having means operable to back-space the totalizer, of a rockable frame including a universal bar having direct contact with all the numeral-key levers, and a projecting arm on said frame, said back-space lever having means depressible with the lever to block the rocking of said arm and lock all the numeral-key levers by the locked universal bar until the back-space key is restored.

4. In a computing machine having a traveling totalizer, the combination with a series of laterally-spaced numeral-key levers, a comput-

ing mechanism operable thereby, and a back-space key-lever alongside the numeral-key levers and having means operable to back-space the totalizer, of a rockable frame disposed under all the numeral-key levers, including a universal bar having direct contact with all the numeral-key levers and being rockable by each numeral-key lever when depressed, and an arm rockable with said universal bar to swing under the back-space lever and prevent its operation until the numeral-key is restored.

5. In a typewriting and computing machine, the combination of typewriting mechanism including a plurality of rows of alphabet-keys, each row forming a bank, computing mechanism including a series of levers, each lever having two numeral-keys, the upper and lower numeral-keys of said levers being arranged in two rows, one row banked above the banks of alphabet-keys and the other row of numeral-keys banked below the banks of alphabet-keys, and a series of key-arresters arranged under the lower row of numeral-keys and spreadable by the depression of any numeral-key-lever to prevent the depression of any other numeral-key-lever, said key-arresters located close to said lower row of numeral-keys and beneath but clear of all levers carrying the lower row of alphabet-keys.

6. In a computing machine having a main frame, a bank of numeral-key levers and a separate bank of tabulating-key levers, a self-contained key-locking structure readily attachable and removable to and from said frame, said structure including a yoke attachable to said frame and bridging said banks of key-levers, a series of spreadable key-locks mounted on said yoke adjacent the numeral-key levers and having a working gap therebetween to admit only one numeral-key lever at a time, a universal bar rockably mounted on said yoke and contacting all the tabulating-key levers, and means carried by said yoke, co-operating with said universal bar upon depression of any tabulating key to close said gap between the key-locks and thereby prevent operation of any numeral-key during operation of a tabulating key.

7. In a computing machine having a main frame, a bank of numeral-key levers and a separate bank of tabulating-key levers, a self-contained key-locking structure readily attachable and removable to and from said frame, said structure including a yoke attachable to said frame and bridging said banks of key-levers, a series of spreadable key-locks mounted on said yoke adjacent the numeral-key levers and having a working gap therebetween to admit only one numeral-key lever at a time, a universal bar rockably mounted on said yoke and contacting all the tabulating-key levers, and means carried by said yoke, co-operating with said universal bar upon depression of any tabulating key to close said gap between the key-locks and thereby prevent operation of any numeral-key during operation of a tabulating key, said universal bar, said means co-operating therewith, and the key-locks being arranged so that the tabulating keys are locked by the universal bar during the operation of any numeral-key.

8. In a typewriting and computing machine, the combination of a plurality of rows of alphabet-type keys, each row forming a bank, computing mechanism including a series of levers having numeral-keys arranged in a row behind the banks of alphabet-keys, each lever having also an extension, said extensions being arranged in a row

in front of the banks of alphabet-keys, and a series of key-arrestors arranged under the row of said extensions and spreadable by means of said extensions upon the depression of any numeral-key to thereby prevent the depression of any other key-lever, said key-arrestors located close to said row of extensions and beneath but clear of all levers carrying lower rows of alphabet-keys.

9. In a computing machine having numeral-keys and a carriage, the combination with a power-driven carriage-return mechanism, and a series of numeral-key locks having a working gap therebetween to permit the depression of only one numeral-key at a time, of a member movable to close said gap, a self-returning key operable to trip the carriage-return mechanism into action, said mechanism being restorable for automatic termination of the carriage-return operation, a connection whereby depression of said carriage-return key moves said member to gap-closing position, and a normally withdrawn latch brought into effective position by the tripping of the carriage-return mechanism by said carriage-return key to hold the latter depressed and thereby lock said numeral-keys during the carriage-return operation, said latch being arranged to release the carriage-return key upon conclusion of the carriage-return operation by restoration of said mechanism, said gap-closing member co-operating to block depression of the carriage-return key during operation of any numeral-key.

10. In a computing machine having a row of fore-and-aft extending numeral-key levers, and a row of fore-and-aft extending tabulator-key levers below the numeral-key levers; a mounting disposed below and extending transversely of the tabulator-key levers, a series of elements rising from said mounting to reach between and above the tabulator-key levers, said elements arranged so that their upper ends form a series of key-locks spreadable by any numeral-key lever, to lock the other numeral-key levers, end stops being provided to limit the spread of the key-locks so as to admit only one numeral-key lever at a time, and means operative by any tabulator-key lever and co-operative with the key-locks to prevent operation of the numeral-keys during tabulating.

11. In a computing machine having a row of fore-and-aft extending numeral-key levers, and a row of fore-and-aft extending tabulator-key levers below the numeral-key levers; a mounting disposed below and extending transversely of the tabulator-key levers, a series of elements rising from said mounting to reach between and above the tabulator-key levers, said elements arranged so that their upper ends form a series of key-locks spreadable by any numeral-key lever, to lock the other numeral-key levers, end stops being provided to limit the spread of the key-locks so as to admit only one numeral-key lever at a time, and means operative by any tabulator-key lever and co-operative with the key-locks to prevent operation of the numeral-keys during tabulating, said means including a universal bar operatively supported on said mounting for engagement by any tabulator-key lever, and a finger interposable by said universal bar to prevent the spread of the key-locks.

12. In a machine of the character described having main frame side members, a transverse bank of depressible numeral-keys between said side members, and an additional key; a single-key-lock mechanism including a transverse bridge below said numeral-keys and attached to

said side members, and a series of individual elements rising from said bridge and arranged to present at their upper ends a row of heads forming under each numeral-key a gap spreadable by
 5 said numeral-key, said bridge having a pair of upstanding arms co-operating with the ends of the row of heads to limit their spread so as to admit only one numeral-key at a time, one of
 10 said arms having a plunger, one end of which abuts an end of the row of heads, an additional arm of said bridge spaced from the arm having the plunger, an endwise adjustable stud mounted in said additional arm of said bridge and arranged to form with the other end of said stub
 15 an additional spreadable gap, said additional key having provision to fill said additional gap to thereby form an interlock between said additional key and any numeral-key.

13. In a machine of the character described
 20 having a carriage and three orders of mechanisms, namely, a row of numeral-keys, power-operable mechanism including a control device and a key, said control device releasable by said key or independently of said key to return the
 25 carriage, and key-operated carriage-tabulating mechanism; an organization for preventing joint operation of any two of said orders including a series of spreadable key-locks having a working gap therebetween to admit only one numeral-
 30 key at a time, means co-operative with said key-locks whereby simultaneous operation of any numeral-key and either the tabulating mechanism or carriage-return key is prevented, and
 35 other means operative without recourse to the key-locks and the said means co-operative therewith, to prevent joint operation of the carriage-return mechanism and tabulating mechanism, said other means including a member connected
 40 to said tabulating mechanism and effective upon the carriage-return control device whereby release of the latter to carriage-returning position is prevented during operation of the tabulating
 45 mechanism, said member being arranged relatively to said control device so that release of the latter to carriage-returning position prevents operation of the tabulating mechanism.

14. In a computing machine, the combination with a row of fore-and-aft extending numeral-key levers, and a row of fore-and-aft extending
 50 tabulator-key levers below the numeral-key levers, of a single-key-lock mechanism for the numeral-key levers including a mounting disposed below, and extending transversely of, the
 55 tabulator-key levers, and a series of elements rising from said mounting and arranged to reach between and above the tabulator-key levers, said elements being further arranged so that their upper
 60 ends form a series of key-locks spreadable by any numeral-key lever to locate the other numeral-key levers, end stops being provided to limit the spread of the key-locks, so as to admit only one numeral-key lever at a time.

15. In combination, in a machine of the character described having a transverse row of numeral-key levers mounted between side-members
 65 of an open-bottom machine-frame having supporting feet, whereby said key-levers and certain underlying fore-and-aft extending machine-

parts are disposed above a machine-supporting desk; a self-contained detachable key-locking structure for preventing simultaneous depression of more than one of said key-levers, including a bar arranged to span all of said key-levers
 80 and having at each end an upright portion disposed between the end of the key-lever row and the frame side-member, said bar being arranged for attachment to the frame side-member so that the body of the bar forms a bridge below
 8 said lower machine-parts and clearing said machine-supporting desk, and a series of upstanding key-locking elements pivotally supported at their lower ends on said bridge and rising there-
 9 above to reach above said machine-parts, the upper ends of said elements forming a transverse row of key-locking heads contiguous to said key-levers and confined between said upright portions
 9 of said bar, said upright portions co-operating to limit the spread of said row of heads, so as
 9 to admit only one key-lever at a time.

16. In a machine of the class described, the combination with case-shifting mechanism including a shift-key, and a row of numeral-keys, of a self-returning universal-bar structure dis-
 100 placeable by operation of any numeral-key and lockable to prevent said operation, and a locking element movable by said shift-key into and past effective position relative to a co-operating
 105 part of said universal-bar structure to lock the latter and thereby the numeral-keys substantially throughout the shift-key stroke in initial direction, and to leave said numeral-keys free for
 110 operation at the end of said stroke, said locking element and its connection to the shift-key being arranged so that the return of the shift-key
 115 may take place independently of the return of the locking element, the latter being self-returning, whereby said locking element and universal-bar part are ineffective to govern the return
 115 strokes of said shift-key and numeral-key.

17. In a machine of the class described, the combination with case-shifting mechanism including a shift-key, and a row of numeral-keys, of a self-returning universal-bar structure dis-
 120 placeable by operation of any numeral-key and lockable to prevent said operation, and a locking element movable by said shift-key into and past effective position relative to a co-operating
 125 part of said universal-bar structure to lock the latter and thereby the numeral-keys substantially throughout the shift-key stroke in initial direction, and to leave said numeral-keys free
 130 for operation at the end of said stroke, said locking element and its connection to the shift-key being arranged so that the return of the shift-key
 135 may take place independently of the return of the locking element, the latter being self-returning, whereby said locking element and universal-bar part are ineffective to govern the re-
 135 turn strokes of said shift-key and numeral-key, said locking element and the co-operating part of the universal-bar structure being arranged to prevent initiating a stroke of the shift-key from
 140 normal position during operation of a numeral-key.

ALFRED G. F. KUROWSKI.