

No. 871,761.

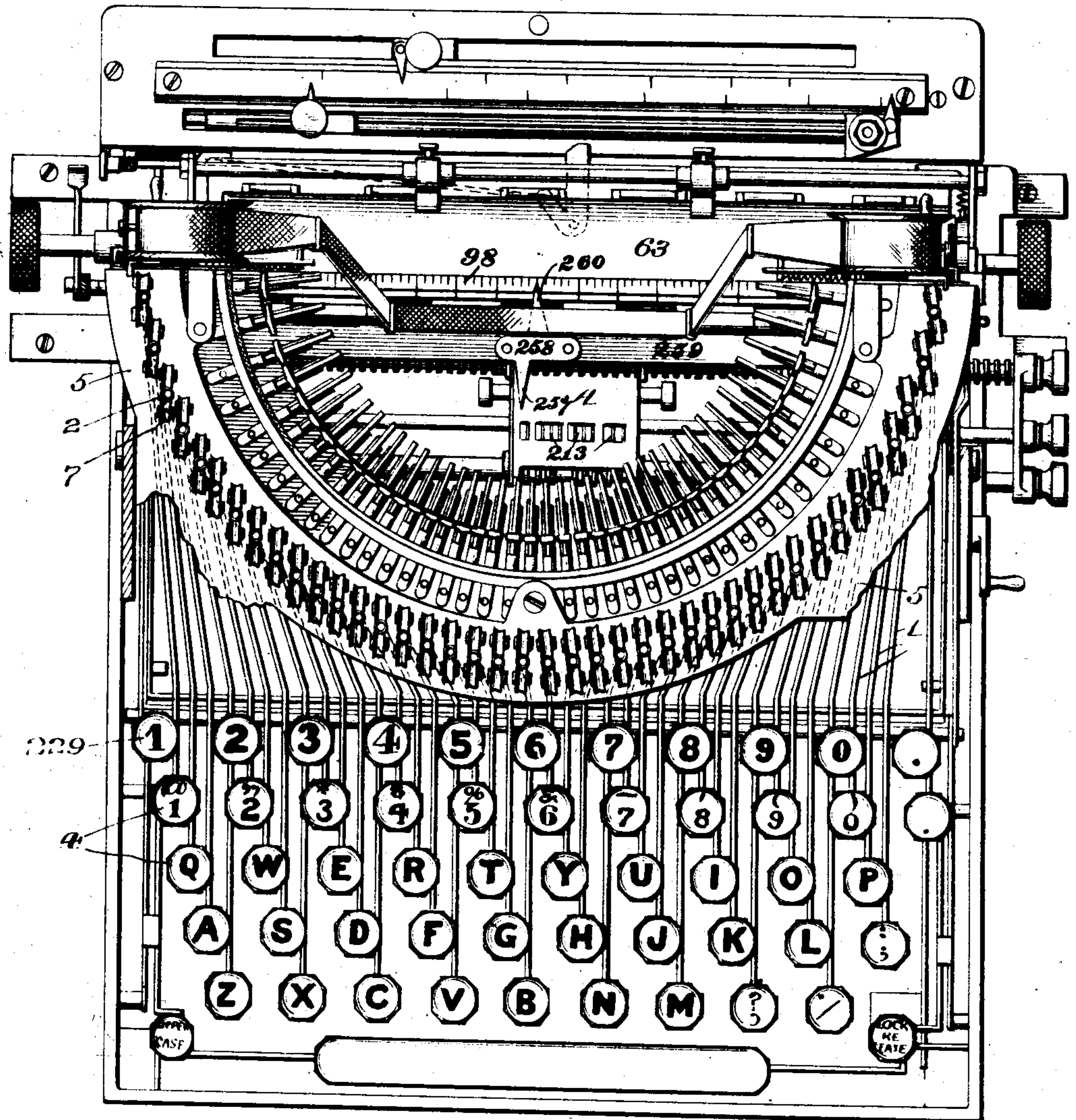
PATENTED NOV. 19, 1907.

J. C. LOTTERHAND.  
ADDING ATTACHMENT FOR TYPE WRITERS.

APPLICATION FILED APR. 27, 1901.

8 SHEETS—SHEET 1.

Fig. 1



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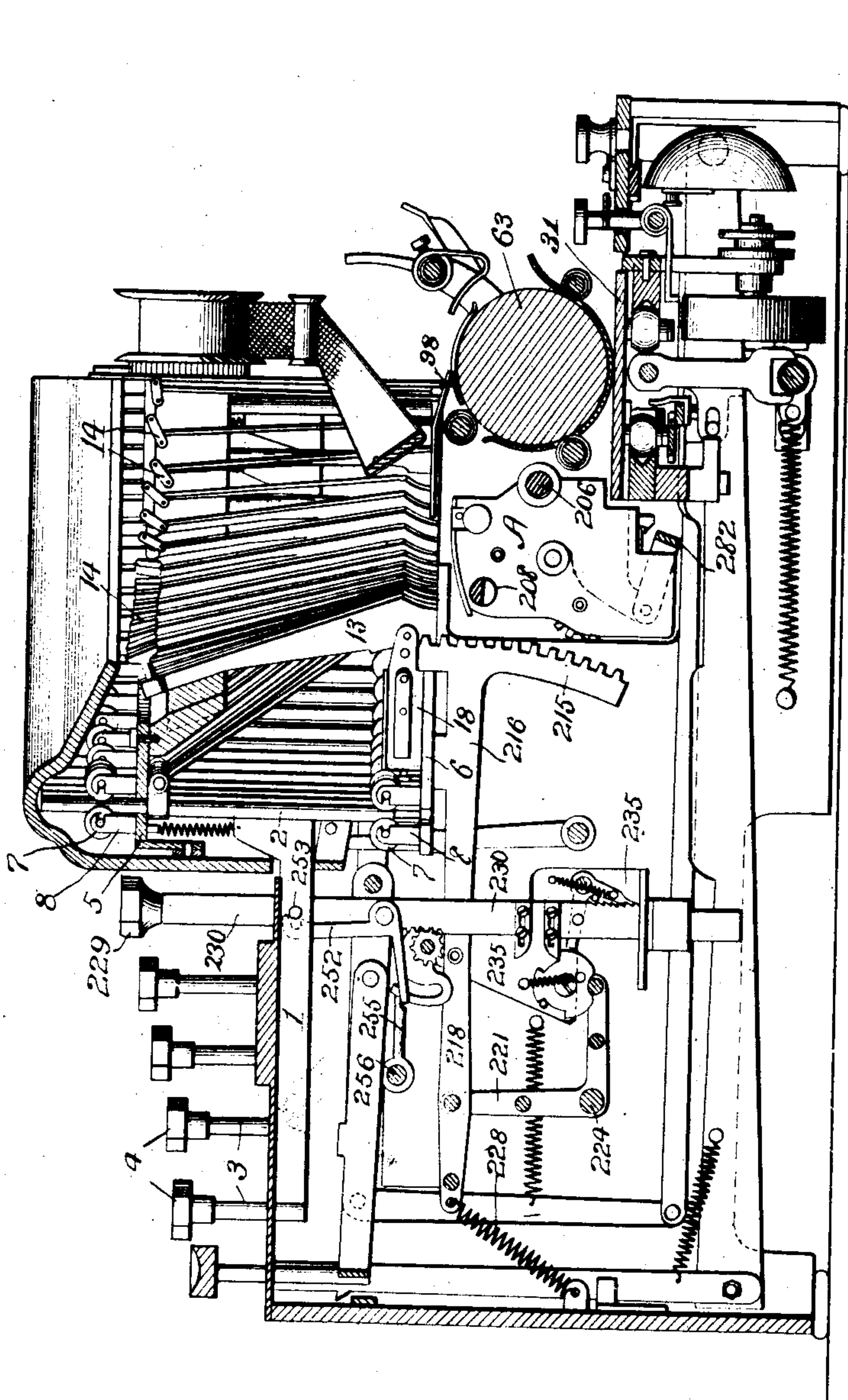
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6 SHEETS—SHEET 2.

Fig. 2



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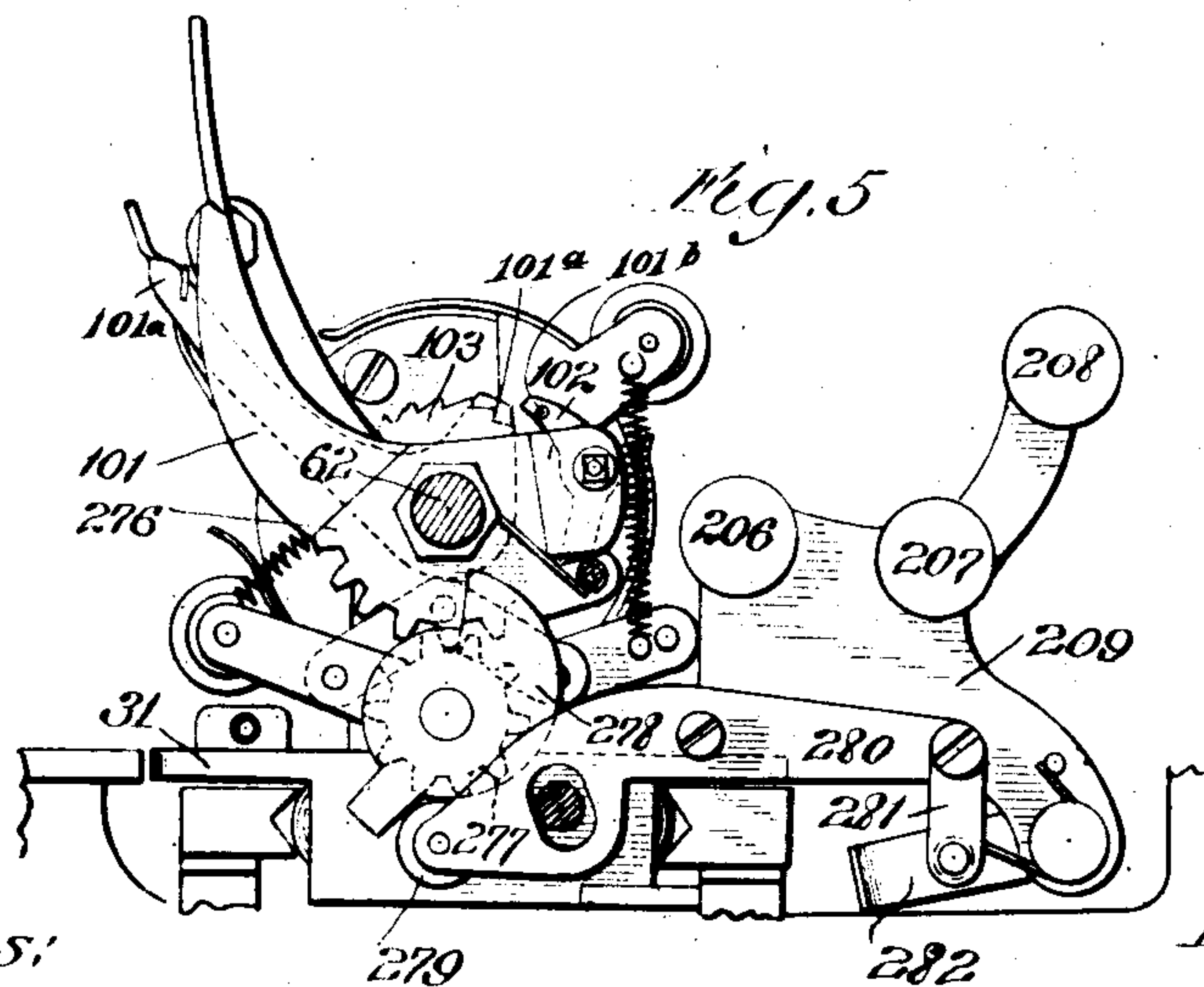
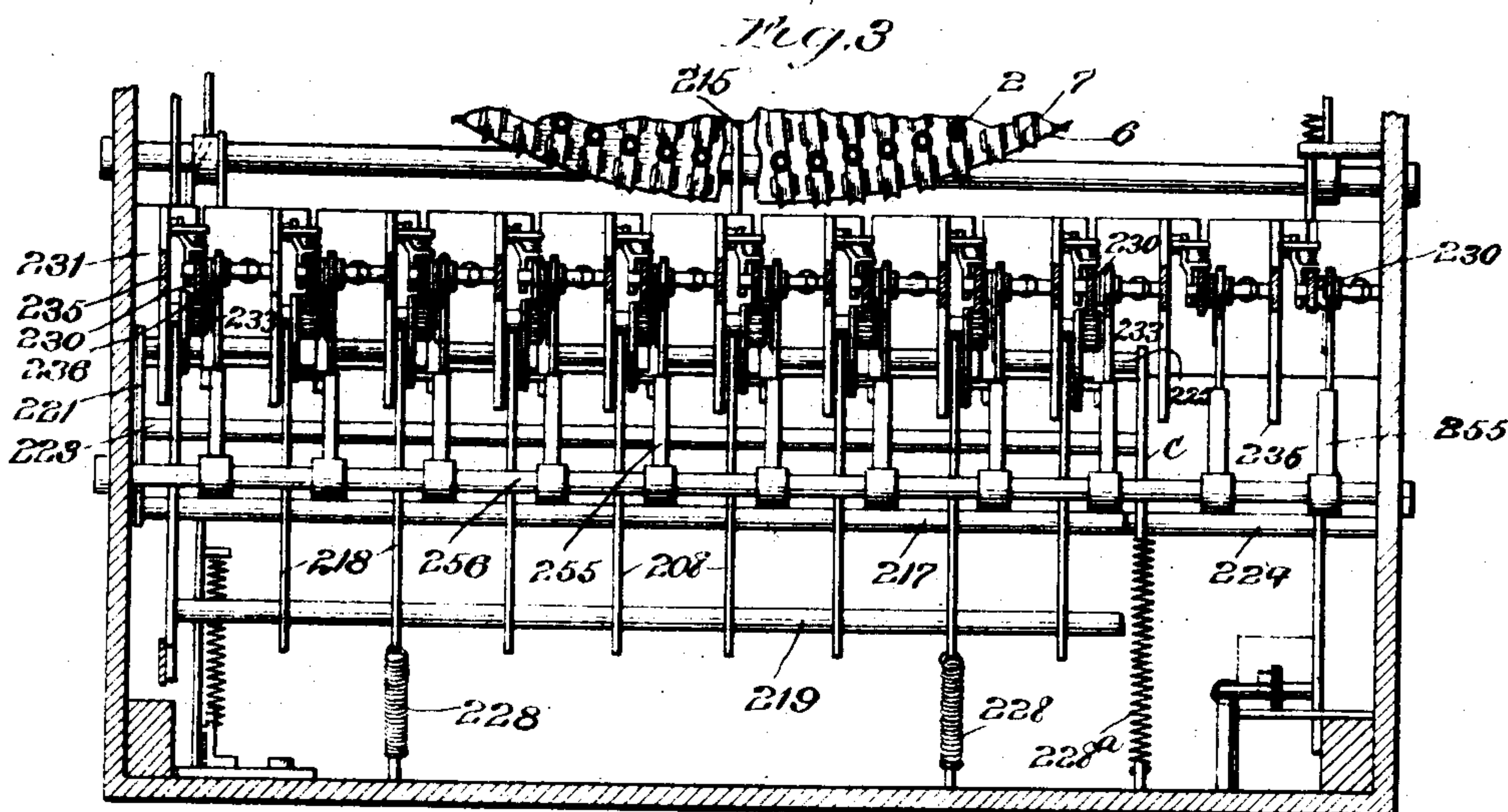
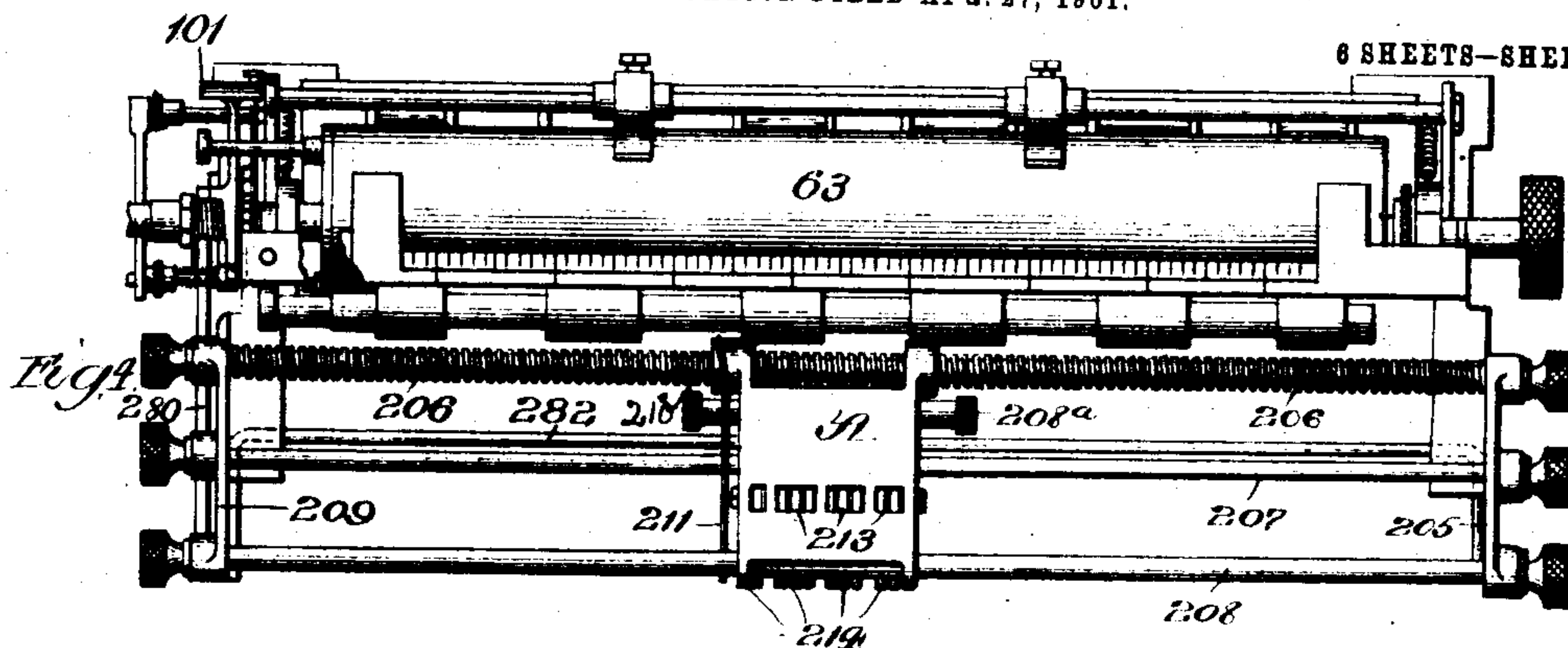
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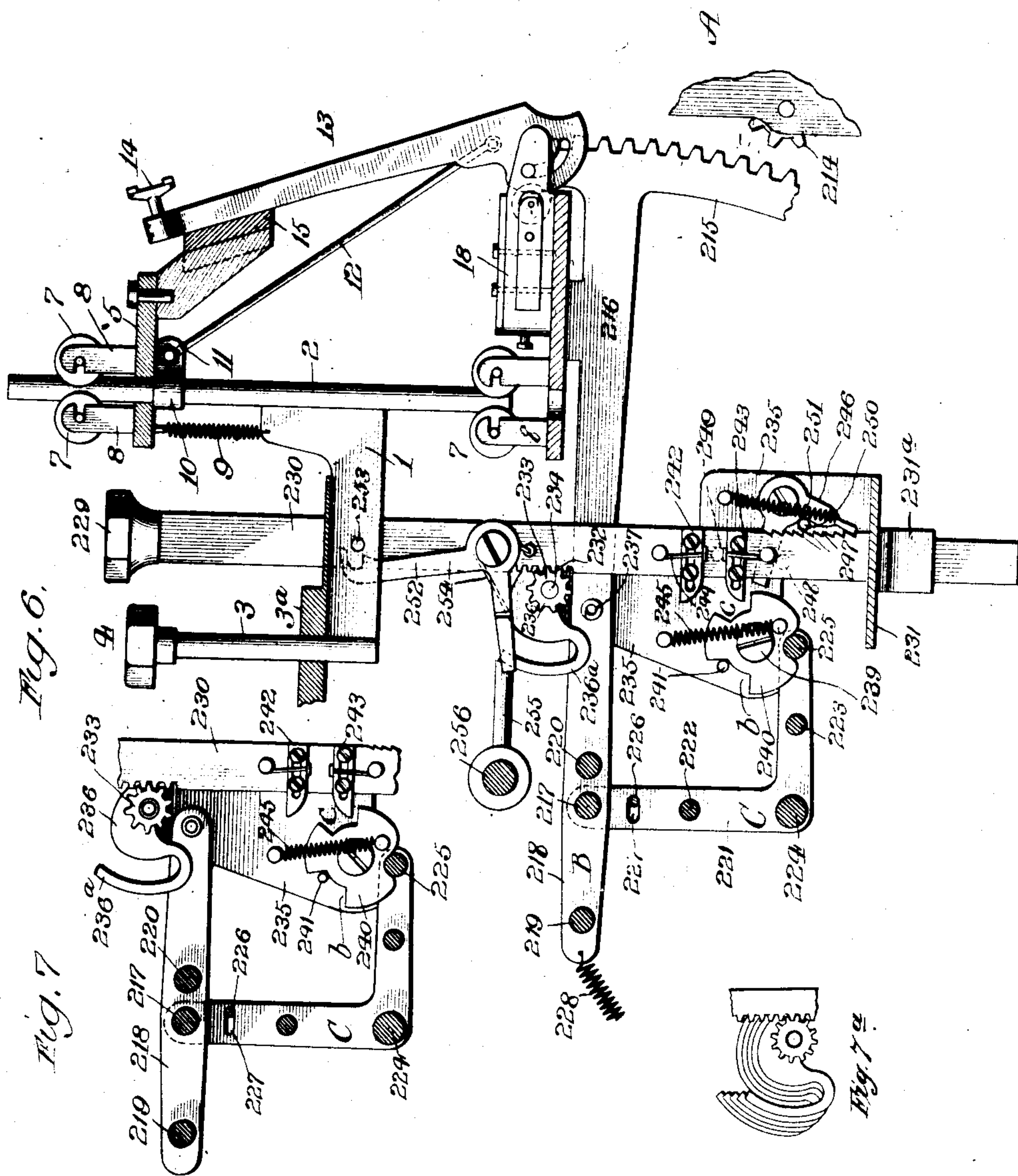
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6 SHEETS—SHEET 4



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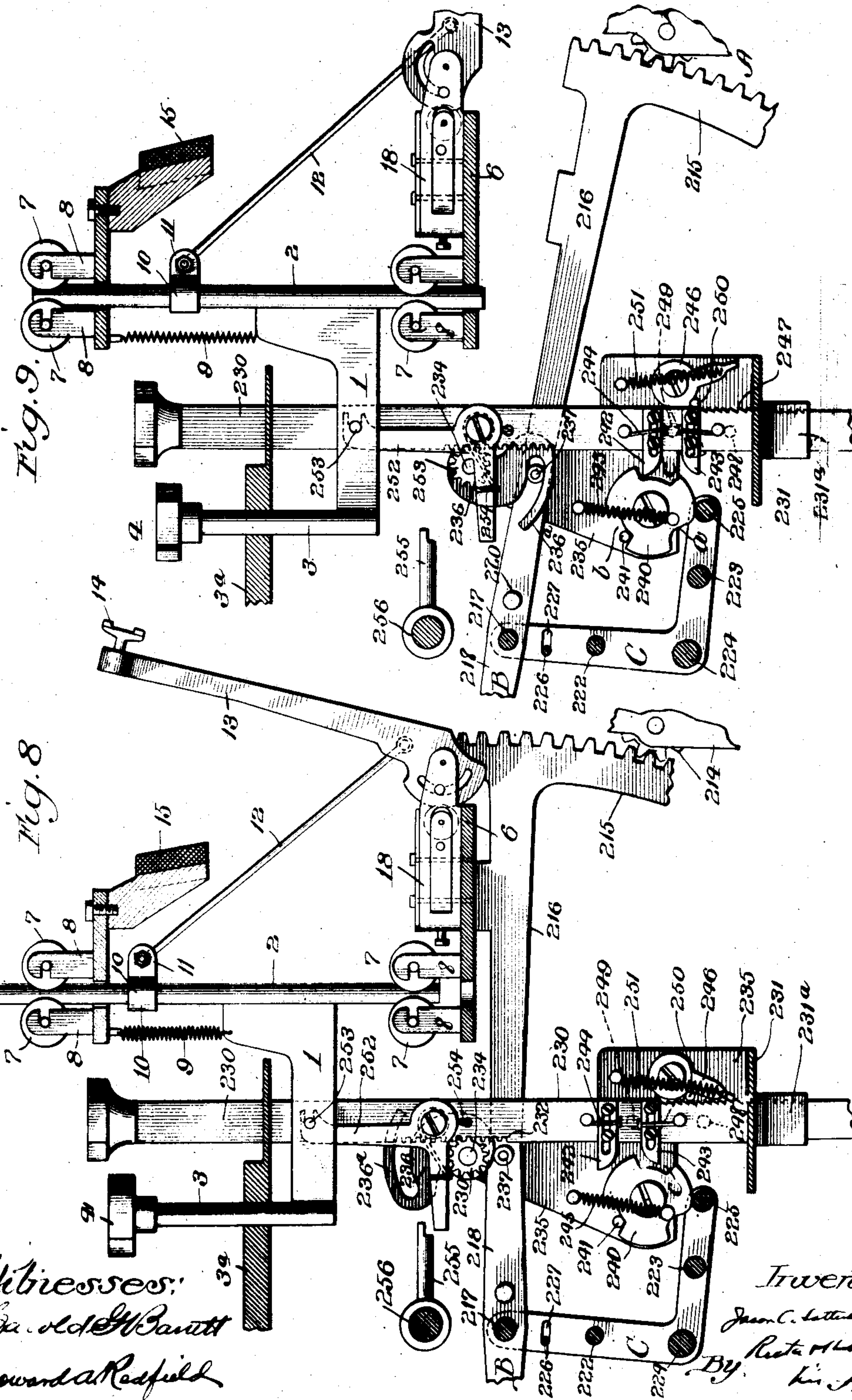
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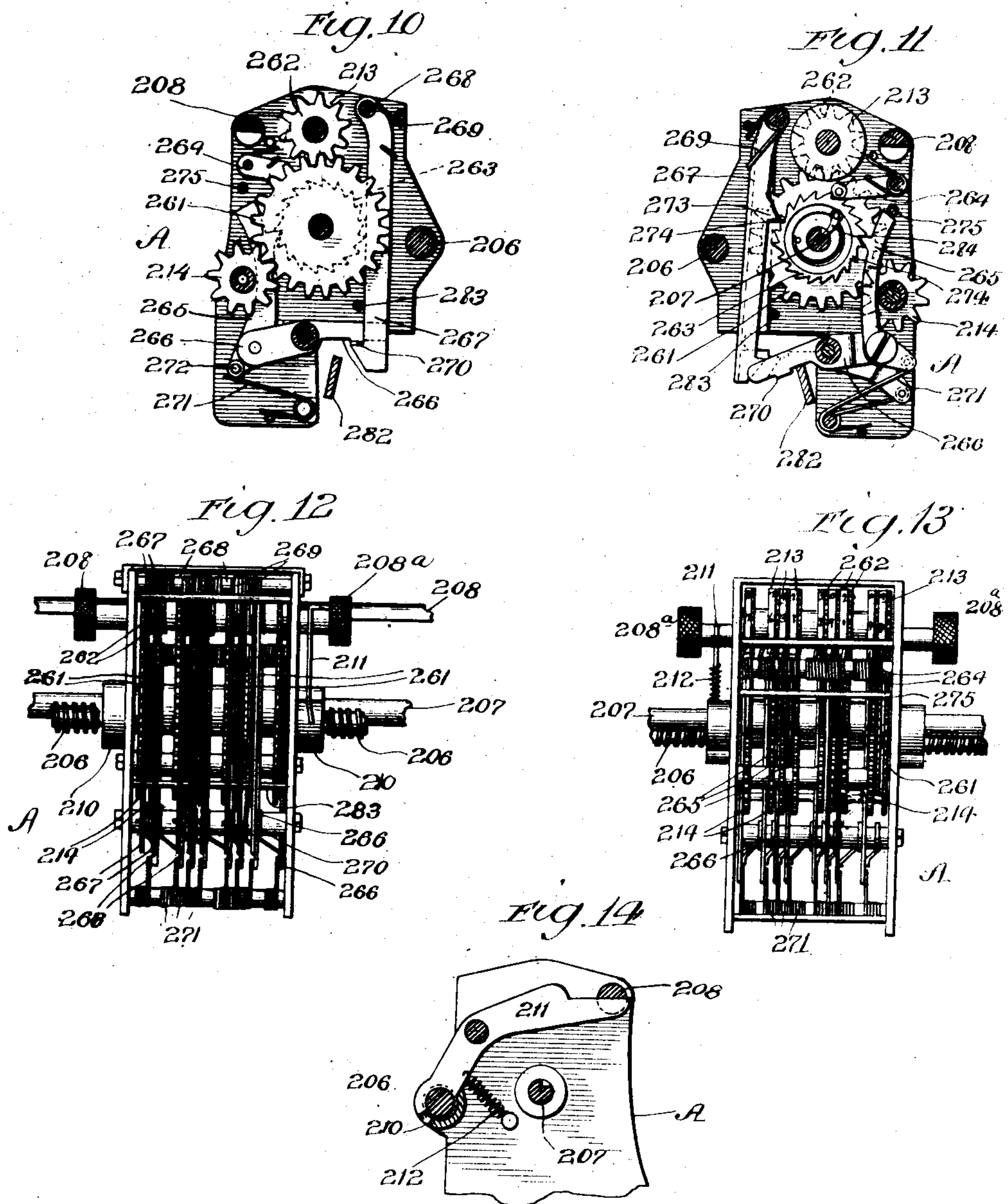
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APPLICATION FILED APR. 27, 1901.

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# UNITED STATES PATENT OFFICE.

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## ADDING ATTACHMENT FOR TYPE-WRITERS.

No. 871,761.

Specification of Letters Patent.

Patented Nov. 19, 1907.

Original application filed January 17, 1901, Serial No. 43,599. Divided and this application filed April 27, 1901. Serial No. 57,797.

*To all whom it may concern:*

Be it known that I, JASON C. LOTTERHAND, a citizen of the United States, residing at the city of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Adding Attachments for Type-Writers, of which the following is a description, reference being had to the accompanying drawings, forming part of this specification.

The present application is a division of application Serial No. 43,599 filed by me on January 17, 1901, for improvements in typewriting machines and adding attachments therefor.

The subject matter of the present application consists of certain improvements in adding machines and in their combination with typewriting machines; all of which will be hereinafter more fully described and particularly pointed out in the claims.

In the accompanying drawings Figure 1 is a top plan view of the machine, with the upper part of the casing removed and part of the frame work broken away, to expose the parts beneath; Fig. 2 a middle vertical section of the machine; Fig. 3 a sectional plan view of the forward part of the machine beneath the type-keys; Fig. 4 a top plan view of the paper-carriage of the typewriter, with the adding device mounted thereon; Fig. 5 an elevation of the left hand end of Fig. 4; Fig. 6 an enlarged detail view showing one of the adding keys and coöperating parts; Fig. 7 a detail of some of the same parts; Fig. 7<sup>a</sup> a detail from Fig. 7 showing the graduations of the cams; Fig. 8 a view corresponding to Fig. 6 with the adding key partially depressed and coupled to the type key; Fig. 9 a similar view showing the adding key fully depressed; and Figs. 10 to 14, inclusive, detail views of the adding device.

The same reference numerals refer to identical parts in the several views.

The description of my present invention may be best understood if prefaced by a brief explanation of the type-bar and key mechanism of the typewriting machine in connection with which my adding attachment is illustrated, in the accompanying drawings. This mechanism is best shown in Figs. 1, 2, 6, 8 and 9 where it will be seen that the operating type keys of the machine consist of thin arms or plates 1 rigidly secured at their rear ends to vertically sliding

rods 2 (or formed integral therewith), and having secured to their front ends vertical stems 3 passing upward through and loosely guided in apertures in the forward top plate 3<sup>a</sup> of the machine and carrying at their upper ends the usual key-buttons 4. The rods 2 are arranged in a semi-circle in front of and concentric to the printing point, as shown in Fig. 1, and are guided at their upper and lower ends in the frame plates 5 and 6, or bearings upon said plates. Each of these plates is provided with a semi-circular row of coincident apertures for the passage of the upper and lower ends of the rods 2, but in the present instance, to relieve friction, the rods 2 do not have their bearings directly in said apertures but are guided by and have their bearings between pairs of grooved anti-friction rollers 7 which are mounted as shown in supports 8 upon the frame plates 5 and 6. Coiled springs 9 connected at their lower ends to the key plates 1 and at their upper ends to the under side of the frame plate 5 yieldingly hold the rods 2 in elevated position and serve to return them thereto after depressions of the keys.

Secured upon the rods 2 are collars 10, provided upon their rear or inner sides with ears 11 projecting radially toward the printing point, to which ears are connected the upper and outer ends of wires or rods 12 whose lower or inner ends are connected to the type-bars 13. These type-bars are pivotally supported at their lower ends, concentric to the printing point, in hangers 18 upon the frame plate 6, and carry at their upper ends the usual type-blocks 14 bearing upper and lower case type-characters. The depression of the rods 2 causes the type-bars to be swung inward and downward and their type brought into contact with the upper side of the platen roller 63 at the printing point, while the return of the parts by the springs 9 restores the type-bars to their normal position, where they rest against a suitable semi-circular support 15 secured to and depending from the frame plate 5.

The purpose of my novel adding attachment, constituting the subject matter of my present application, is to enable amounts to be printed upon the sheet of paper upon the platen roller on the paper carriage of the typewriter and at the same time add it into a total sum upon the adding device, so that



when the foot of the column of work is reached, the total of the amounts in the column ascertained by reference to the adding device and the necessity for adding up the column by mental calculation be thereby obviated. I am of course aware that it has heretofore been proposed to combine adding mechanisms with typewriters in various ways for this purpose, and my invention consists in a novel and improved combination of adding mechanism and typewriter, as well as in novel features of the adding mechanism itself. What I will term for brevity, the adder A of this mechanism is mounted upon and adjustable longitudinally of the paper carriage of the typewriter, Figs. 1, 2 and 4, to which end the base plate 31 of the paper-carriage has secured to its right hand end, Fig. 4, a forwardly projecting side plate 205 in which are journaled the right hand ends of three rods 206, 207 and 208, whose opposite ends are journaled in a corresponding side plate 209 secured to and projecting forwardly from the base plate 31 of the paper-carriage at its left hand end. The rods 206, 207 and 208 are provided at their opposite ends with milled thumb pieces by which they may be readily turned for purposes hereinafter described.

The inclosing casing of the adder A is provided upon its rear side with ears 210, Fig. 4, through which passes the rod 206, while at its upper forward corners said casing is provided with eyes through which passes the rod 208. The rod 207 passes substantially through the center of the adder and is provided with a longitudinal groove, while the rod 206 is screw-threaded, and the rod 208 has its under side cut away Figs. 10 and 14, all for purposes hereinafter explained.

Fulcrumed upon the left hand side of the casing of the adder is a lever 211, Figs. 4 and 14, whose rear end is bent to correspond to the pitch of the threads upon the screw rod 206, and fits in a corresponding slot in the left hand ear 210 of the adder casing, and when permitted engages the threads of the rod 206, as shown in Fig. 14, a coiled spring 212 connected to the lever tending to maintain such engagement. The upper forward end of the lever 211 fits against the flattened or cut away under side of the rod 208, Fig. 14, and when said rod is turned so as to bring its upper rounded surface against the lever the latter will be rocked and its lower rear end thrown upward out of engagement with the threads upon the screw rod 206.

As will be understood from the foregoing description, by turning the rod 208 so as to disengage the lever 211 from the screw rod 206, the adder will be disengaged from said rod and left free to slide longitudinally upon the rods in either direction, while when the lever is engaged with the screw rod 206 the

adder may be adjusted longitudinally of the rods by turning the rod 206. The purpose of these provisions is to enable the adder to be slid along the rods by hand, to quickly adjust it to approximately the desired position, and to then enable its nicer adjustment to the exact position desired to be effected by turning the screw rod 206. In effecting these adjustments it is simply necessary to first turn the rod 208 so as to disengage the lever 211 from the screw rod 206, then slide the adder along the rods to approximately the desired position, and then turn the rod 208 back to normal position and effect the final setting of the adder by turning the rod 206. The adder casing is provided upon its opposite sides with milled thumb pieces or handles, 208<sup>a</sup>, for shifting it laterally by hand.

Before entering upon a description of the mechanical details of the adder, and preparatory to an explanation of the means for actuating it, it will suffice to say that the adder contains a series of registering wheels 213, Figs. 14, 11 and 13 which represent units and tens of cents, and units, tens, hundreds, thousands, tens of thousands, hundreds of thousands, and millions of dollars, respectively, and are actuated by corresponding pinions 214 projecting from the front side of the adder, which pinions are in turn actuated by a gear-toothed segment or sector 215 carried upon the rear end of a lever 216, Figs. 2, 6, 8 and 9. This lever 216 projects rearwardly from, and its forward half or end constitutes a rigid part of, a rocking frame B fulcrumed upon a rod 217 and composed of a series of thin bars or levers 218, Figs. 2, 3, 6, 8 and 9, rigidly connected together at their forward ends by a tie-rod 219, and slightly in rear of the rod 217 by a second tie-rod 220. As appears in Figs. 6, 8 and 9, the forward end of the lever 216 constitutes one of the arms 218 of this rocking frame, and in the further description of the parts it will be considered simply as one of said arms, Fig. 7.

The rod 217 upon which the rocking frame is fulcrumed is supported at its opposite ends in the upper ends of a bell-crank frame C composed of a pair of bell-crank arms or levers 221 rigidly connected together by tie-rods 222 223, to form a single rocking frame, and fulcrumed at their angles upon a rod 224 secured at its opposite ends in the side frames of the machine. The rear ends of the bell-cranks 221 are connected by a transverse rod 225 which coöperates with the cams hereinafter described. A stud 226 Fig. 9 projecting inward from the left hand side frame of the machine Figs. 6, 7, 8 and 9 passes through a slot 227 in the left hand bell-crank 221 and limits the forward and backward movements of the upper ends of said bell-cranks and the rocking frame of



which they constitute a part. Springs 228 connected at their upper rear ends to the front ends of several of the arms 218 of the rocking frame B which carries the lever 216 and sector 215, and at their lower forward ends to lugs upon the inner side of the front frame plate, Figs. 2, 3 and 6, and a supplemental spring 228<sup>a</sup> connected to the upper end of the right hand bell-crank 221, Fig. 3, serve to pull the frames forward to the limit of movement permitted by the stud 226 engaging the slot in the bell-crank 221, and to also yieldingly hold the rear end of the lever 216 and sector 215 in elevated position, as shown in Figs. 2 and 6, in which position the upper edge of the lever 216, or a projecting bearing surface thereon, rests against the under side of the frame plate 6. The springs 228 thus serve to yieldingly hold the sector 215 in and return it to its normal upper and forward position, in which position it is out of mesh with the pinions 214 of the adder A, as shown in Figs. 2 and 6. When, however, the lever 216 is moved rearward the sector 215 will be engaged with one of the pinions 214 of the adder, as in Fig. 8, and when the sector is then swung downward such pinion will be turned a distance corresponding to the downward movement given the sector, and a corresponding amount be added upon the registering wheel 213 actuated by such pinion. Such rearward and downward movements are given the sector 215 at each adding operation of the machine, by the means to be now described.

It will be seen that the adder wheels of the adder are arranged in divisions. That is, the cents division is separated a space from the hundreds division, and the latter a higher space from the thousands division, and as the platen and carriage must move to a greater extent in carrying the adder wheels past the sector between such divisions, the figures of the numbers printed have spaces between the different divisions, thus facilitating the return of the number and distinguishing between dollars and cents.

As shown in Fig. 1 the keyboard of the machine is provided, in rear of the regular type-keys, with a supplemental row of keys whose finger buttons 229 bear in succession the nine digits, in regular order from left to right, and also a cipher and period upon the tenth and eleventh keys at the right hand end of the row. The first nine of these supplemental keys constitute the adding keys of the machine, while the two additional keys are provided for convenient use in conjunction with such adding keys, as hereinafter explained. The finger buttons of these supplemental adding keys are mounted upon the upper ends of straight vertically reciprocating stems or shanks 230 which are guided near their upper ends in slots in the forward top plate of the machine, and at their lower ends

in slots in a transverse plate 231 secured at its ends to the opposite side frames of the machine, Figs. 2, 3, 6, 8 and 9, and in guide brackets 231<sup>a</sup> secured to the under side of the plate 231, Figs. 6, 8 and 9. Each key stem 230 is combined with means for actuating the adding mechanism therefrom, each key imparting a positive and definite and uniform degree of movement differing in degree from that of each of the other keys. Thus each stem is provided upon its forward edge, about midway of its length, with rack teeth 232 engaging a pinion 233 mounted upon a stud 234 projecting from the side of a supporting plate 235 and having fast upon and turning with it a cam 236 having a hooked or slotted tail 236<sup>a</sup> and adapted to cooperate with a stud 237 (surrounded by an anti-friction collar) projecting from the side of the adjacent arm 218 of the rocking frame B which carries the lever 216 and actuating sector 215, as hereafter described. There is one of the supporting plates 235 for and beside each of the adding key stems 230. These plates are in the present instance of the irregular shape partially indicated in Figs. 6, 8 and 9, but their upper ends are there hidden by the key stems 230, since the upper ends of the plates and the key stems are of substantially the same width, as shown in Fig. 3, where the upper ends of the plates are shown in section. These narrow upper ends of the plates fit and are supported in slots in the top plate of the machine, similar to the slots through which the key stems 230 pass, and at their lower ends they rest upon the transverse frame plate 231, and have depending portions extending downward through slots in said plate and bent at right angles and secured to the under side thereof by screws.

Mounted upon a screw stud 239 upon the lower end of the forwardly projecting portion of each of the plates 235 is a cam disk 240, Figs. 6, 8 and 9, provided in its periphery with three notches or recesses *a b c* approximately equi-distant from each other. In the normal position of the parts the lowermost notch *a* engages the rod 225 of the rocking bell-crank frame C, the forward notch *b* receives a stud 241 on the plate 235, which limits the turning movements of the disk upon the stud 239, while the third notch *c* cooperates with two spring-pressed dogs or pawls 242-243 mounted by slots and screw-studs upon the side of the key stem 230 and pressed forward by springs 244 secured at one end to the key stem 230 and at their opposite ends suitably connected to the pawls 242 and 243. It results from this construction and arrangement of the parts that whenever one of the adding keys is depressed its pawl 243 will engage the shoulder on the disk 240 formed by the lower wall of the notch or recess *c* in said disk and turn the latter from the position shown in Fig. 6 to that shown in



Fig. 8, in which latter position the disk will be held, with the lower wall of its notch *b* in contact with the stud 241, by a coiled spring 245 connected at its lower end to a pin upon the disk and at its upper end to the plate 235. This movement of the cam disk 240 from the position of Fig. 6 to that of Fig. 8 will have forced the rod 225 of the bell-crank frame C downward and throw the upper end of said frame rearward, and thereby shifted the frame B rearward and engaged the sector 215 with one of the pinions 214 of the adder A, as shown in Fig. 8, so that any downward movement then given the sector 215 will be transmitted to the corresponding registering wheel. The rearward movement given the sector and the frame B by the turning of the cam disk, in the manner described, will have carried the studs 237 upon the arms 218 of said frame rearward into the paths of the cams 236, Fig. 8. Thus it will be seen that the adding mechanism is normally disconnected from the actuating means operated by the keys, but that on the movement of any one of the adding keys the actuating mechanism and the adding mechanism are operatively connected. As the downward movement of the key stem 230 continues the cam 236 geared to it by the pinion 232 will receive in its slot the stud 237 and force the rear end of the rocking frame and the sector 215 downward a distance proportionate to the pitch of the cam. The pitch of the respective cams is so graduated Fig. 7<sup>a</sup> that the cam geared to the left hand or units adding key will, at a full depression of said key, move the sector 215 downward one unit of distance, and add a single unit to the registering wheel in gear with the segment at such time; while the succeeding keys to the right will move the sector additional units of distance corresponding to their respective values and transmit corresponding degrees of movement to the registering wheel in gear with the segment. The slotted or hooked tails 236<sup>a</sup> of the cams are provided for the purpose of insuring positive movements and positively locking the stud 237 to the cam at the end of the downward movement imparted to it by the cam, so as to prevent any excessive movement or overthrow of the sector and registering wheels due to momentum given the parts by a quick or violent depression of the key, the inner ends of said slots being concentric with the axis on which the cams turn. It will be seen therefore that there is a positive connection or locking together of each adding key and the actuating mechanism during the entire time they are cooperating to operate the adding mechanism, securing positive action in every instance.

As the adding key continues its downward movement from the position shown in Fig. 8 to that shown in Fig. 9 the forward end of its upper pawl 242 will contact with the pe-

riphery of the cam disk 240 above the notch *c* in said disk and be forced backward thereby as the key descends, until the upper edge or point of the pawl has been carried below the upper end of the notch or recess, whereupon the pawl will swing forward into said recess, below the shoulder formed by its upper wall, as shown in Fig. 9, and at the beginning of the return upward movement of the key stem said pawl will contact with said shoulder and turn the cam disk (with the aid of the spring 245) back to normal position, Fig. 6, thereby permitting the rod 225 to rise into the notch *b* in the disk and the springs 228 connected to the rocking frame B to pull the latter forward and disengage the sector from the pinion; and during the further upward movement of the key stem the sector 215, being free from the pinion 214, will rise to normal position as fast as the backward movement of the cam 236, against which its stud 237 bears, will permit. As the key stem rises the lower pawl 243 will contact with and be forced backward by the periphery of the cam disk 240 after the latter has been returned to normal position by the upper pawl and spring 245, as described, until it clears the shoulder formed by the lower wall of the notch *c* in the disk, whereupon it will spring forward into said notch, as in Fig. 6, ready to turn the cam disk again upon the next downward movement of the key. Suitable resetting springs connected to the left hand sides of the keys 230, and therefore not shown in Figs. 6, 8 and 9, serve to lift the keys and yieldingly hold them in normal position.

For reasons hereinafter specified, it is essential to insure the full downward movement of the adding key each time it is depressed and to this end I provide a complete-stroke device for each key, which may be of any suitable construction. As shown, it consists of a bellcrank lever 246 pivoted to the plate 235 in rear of and adjacent the key and having the lower end of its depending arm shaped to cooperate as a pawl with ratchet teeth 247 formed upon the rear edge of the key stem. The upper forwardly projecting arm of the bell-crank lever 246 lies between two studs 248 249 upon the left side of the key stem, so that at a full depression of the key the upper stud 249 will contact with the upper arm of the bell-crank and depress the same and swing the lower arm of the bell-crank rearward out of engagement with the ratchet 247 on the key stem, as in Fig. 9, while at the return upward movement of the key the lower pin 248 will contact with the under side of the forwardly extending arm of the bell-crank and lift it, and thereby swing the lower arm of the bell-crank forward into engagement with the ratchet upon the key stem again, as in Fig. 6. A stud 250 projecting from the plate 235



between the two arms of the bell-crank limits the movements of the latter in opposite directions, while a coiled spring 251 connected at its upper end to the plate 235 and at its lower end to the lower arm of the bell-crank yieldingly holds the latter in its opposite positions when moved thereto by the contact of the studs 248 and 249 with its upper arm as described.

As will be understood from the foregoing description, when any one of the adding keys is depressed the sector 215 is first thrown rearward and engaged with the adder pinion 214 which is at the time in line with it, and is then swung downward the full distance required to add in the adding mechanism an amount corresponding to the value indicated by such operated key, after which, at the return upward movement of the key, the sector 215 is first withdrawn from engagement with the pinion, by the action of the springs 228, and then swung upward to normal position.

The importance of the absolute locking together of each adder key and the actuating mechanism and of insuring absolutely the full and complete movement of the key after such movement is begun will be evident. If an adder key could be partly depressed and then return to normal position, the result would be to move the adder wheels to an extent to indicate in the adding mechanism an amount less than that indicated by the key, or printed by the connected type. Further, if the key and actuating mechanism were not locked together, a percussive blow on the key might partially depress it and yet cause the actuating mechanism to move by momentum to a greater degree than required to add the amount indicated by the key.

A supplemental set of type-bars and connections coöperating with the adding keys might of course be provided for the purpose of enabling the amounts added upon the adding device to be simultaneously printed upon the sheet of paper on the platen roller, as has heretofore been proposed in machines of this class; but a further feature of my invention consists in combining the adding keys of a machine of this character with the printing devices operated by the corresponding type-keys of the machine in such manner that a single set of type-bars and connections suffices both for the adding keys and the corresponding type-keys in the regular key board of the machine. This enables me to dispense with the nine type bars and their connections which would otherwise be required for the adding keys, and correspondingly reduces the number of parts in the machine and enables all of the type-bars and their connections in a combined typewriting and adding machine to be arranged in the same manner and in the

same space as in an ordinary typewriter having no adding mechanism.

In my present machine a simple and convenient method of combining the adding keys with the printing devices of the corresponding typekeys has been to provide means for automatically and positively locking together the adding keys and the corresponding type-keys whenever the adding keys are depressed, and thereby cause such type-keys to be carried downward by and with the adding keys, to actuate the corresponding type-bars, and as the adder keys are compelled as before described to make a full and complete movement, the adding in the adder mechanism of the amount represented by the key depressed is absolutely insured, a result essential in the practically operative machine. It will be evident that if the adder key and the corresponding type key were not locked together and the adder key could make a partial stroke, such partial stroke might throw the type key sufficiently to print the figure, while an amount less than represented by said figure would be added in the adding mechanism. One means of carrying out this method is illustrated in Figs. 6, 8 and 9 of the drawings, where it will be seen that the stem of each adding key 230 has pivoted to it, some distances below the top plate of the machine, a bell-crank lever 252 having a hooked upper end adapted to coöperate with a stud 253 upon the side of the horizontal plate or arm 1 of the adjacent type-key to lock the two together. A spring 254 coiled around the pivot of the bell-crank 252 and connected at one end to the key stem and at its opposite end to the forwardly projecting horizontal arm of the bell-crank tends to throw the vertical arm of the bell-crank rearward and engage its hooked upper end with the stud 253 upon the type-key plate 1, and thereby positively lock the type-key and adding key together, but when the key stems 230 are in their upper and normal position the upper arms of the bell-cranks are held rocked forward as in Fig. 6 by contact of the front ends of their horizontal arms with stop pins 255 projecting rearwardly from collars fast upon a fixed rod 256 secured at its opposite ends in the side frames of the machine, Fig. 3. When the adding keys are in their upper and normal position, therefore, the hooked arms of the bell-cranks 252 are held out of the path of the studs 253 upon the type-keys, and the latter are free to be depressed independently of the adding keys, in the ordinary operation of the typewriter; while when any adding key is depressed its first downward movement will carry the front end of the lower arm of its bell-crank 252 away from the pin 255 and permit the spring 254 to throw the



hooked upper end of the vertical arm of said bell-crank rearward into engagement with the stud 253 upon the type-key, as in Fig. 8, and thereby lock the two keys together, so that during the further downward and return upward movement neither key can move independently of the other, and the amount represented by the adding key will be added upon the adding device and be also printed upon the paper on the platen by the type-bar connected to the type-key.

A simple lug projecting from the side of the adding key stem 230 above the stud 253 upon the adjacent type-key 1 would of course serve the purpose of causing the depression of the adding key to carry the type-key downward with it, while leaving the type-key free to be depressed independently of the adding key in the ordinary operation of the typewriter; but this would be practically useless for one key could move to a greater extent than the other so that the figure printed would not indicate the amount stored in the adder mechanism. Adding mechanism which is not practically infallible is useless, however accurate it may be generally. To insure absolute accuracy, I provide means to lock the two keys together at the depression of the adding key, so that the type-key cannot be thrown ahead of the adding key by a quick or violent partial depression of the latter and the escapement mechanism of the machine be thereby operated and the paper carriage shifted without first fully depressing the adding key and adding its value upon the registering wheel of proper denomination in the adding device. Any suitable automatic coupling or locking device between the adder and type-writer devices may be employed in carrying out my invention, but the bell-cranks described, and cooperating parts, are simple and efficient.

From the above it will be seen that it is essential for the effective working of the apparatus that the two keys shall upon the actuation of an adder key be so connected that one shall inevitably move with and only with the other and also that after the movement of an adder key begins it shall not be capable of a return movement until its full stroke is completed. When therefore in this specification and in my claims I make use of the terms "connected," "locked together" and "positively locked," I do not mean a mere contact between the parts insuring a partial simultaneous movement but permitting one part to be capable of an independent movement, but I mean an absolute connection of the two in such manner that one cannot move without the other after the movement of the adding key begins and the relation of the two is preserved through the movement of the adder key.

The general operation or mode of use of

the adding mechanism of my machine is as follows: The position which it is desired the vertical column of figures shall occupy upon the sheet of paper having been first determined, the adder A is slid along the paper-carriage to a position opposite such proposed column of figures, and adjusted to exact position for the respective pinions 214 to register with the sector 215 when amounts are being printed in the corresponding denominations in the columns of figures upon the paper. Thus, if it be proposed to print the column of figures in such position that the units of cents shall be opposite the graduation 60 on the scale bar 98, the adder A will be adjusted for the pinion 214 of its units of cents registering wheel to register with the sector 215 when the paper-carriage is in position transversely of the machine to print a figure in the units of cents column at 60. The printing may then be begun in any higher denomination in the column by first moving the paper-carriage the proper distance to the right, and as the adding keys are then successively operated to print the desired amount the paper-carriage will advance step by step toward the left and carry the pinions 214 of the adder successively into line or register with the sector 215, and while in line with each pinion the sector will actuate such pinion and the corresponding registering wheel during the downward movement of the adding key, and the paper-carriage will move the adder to the left to the next lower denomination upon the return up stroke of the adding key, while the sector is disengaged from the pinion, as heretofore described.

To facilitate the adjustment of the adder A in the manner and for the purpose above described I provide a pointer 257 projecting forward from a plate 258 secured to a fixed cross piece 259 of the machine, Fig. 1, which pointer cooperates with the registering wheels 213, or a corresponding scale upon the top plate of the adder casing, to aid in determining the exact location of the adder. When the adder is adjusted transversely of the machine until the pointer 257 stands opposite any given registering wheel 213 the pinion 214 corresponding to such wheel will be in line or register with the sector 215, ready for actuation thereby. A pointer 260 projects from the rear side of the plate 258 over the scale-bar 98 on the paper-carriage, to determine the positions of the latter transversely of the machine, as usual. In adjusting the adding device to print a column of figures with units of cents at 60, as before suggested, the paper-carriage will be moved transversely of the machine until the pointer 260 points to the graduation 60 on the scale bar 98, and the adder A will then be adjusted longitudinally of the paper-carriage until the units registering wheel 213 is brought



opposite the pointer 257, which adjustment of the adder may be effected either entirely by the screw rod 206, or by first releasing it from such rod by turning the rod 208 and then sliding the adder along the rod by hand, and then reengaging it with the screw rod and effecting its final adjustment by turning said rod, as heretofore described.

After the adder has been adjusted for the printing of the column of figures in the desired position upon a sheet of paper the paper-carriage will be slid to its right hand limit of movement, and the desired memoranda be written in the left hand portion of the line with the regular type-keys of the machine. When such memoranda have been completed the paper carriage will be spaced or otherwise moved onward to the left until the desired denominational column or space in the column of figures is brought to the printing point. The amount to be entered will then be printed by operating successively the proper adding keys, and be thereby simultaneously added upon the adder A. The paper-carriage will then be returned to the right, and the platen roller turned to advance the sheet of paper for another line, as usual, and the operation be repeated. When a sheet has been filed, or the lower end of a column of memoranda and figures of desired length has been reached, the sum of all the amounts in the column of figures will be displayed in the top of the adding device upon the wheels 213, so that such sum may be ascertained at a glance without the necessity for any mental calculation. The total of the column of figures, thus ascertained by a glance at the wheels of the adder, may then be written down at the foot of the column by operating the regular type-keys of the machine, thereby leaving the adder unaffected by the printing of such total, and if it is desired to carry forward such total to the head of another column, upon the same or another sheet of paper, it may be printed at the head of such second column with the regular type-keys of the machine and the succeeding amounts in the column be printed with the adding keys, so that when the end of the second column is reached the wheels of the adding device will display the sum of the amounts in both columns, which total may be printed at the foot of the second column with the regular type-keys of the machine, and carried forward to the head of a third column, and so on to any extent desired, the adding device preserving a total of all the amounts printed by the adding keys until its wheels are reset to zero or initial position in the manner hereafter described.

The two right hand keys in the row of adding keys, Fig. 1, bearing respectively a cipher and a period or decimal point, are provided merely for convenience, to enable the

complete amount (including ciphers and decimal points) to be printed with the keys in the rear row alone, without resorting to the corresponding keys in the regular keyboard of the machine. It will of course be understood that these two keys have no mechanical connection with the adding device, as indicated in Fig. 3, but are simply coupled to the corresponding type-keys when depressed to cause the type-bars actuated by such adding keys to print ciphers and decimal points in the column of figures.

In the present instance, as shown in Figs. 1, 3 and 4, I have left spaces between the tens of cents and units of dollars registering wheels, and between the hundreds of dollars and thousands of dollars wheels, and between the hundreds of thousands and millions of dollars wheels, so that it is necessary to operate the space bar of the machine in passing from the millions denomination to the hundreds of thousands, and from the thousands to the hundreds, and to operate either the space bar or the decimal point key between the units of dollars and tens of cents wheel. I have arranged the registering wheels in this manner because of the common practice of printing amounts with such spaces between the several denominations in adding machines now in very extensive use, but it is not in any way essential to and forms no part of my invention, and so far as the latter is concerned the registering wheels may be arranged immediately adjacent each other so that any amount may be printed and added by successively operating the adding keys immediately after one another, without any operation of the space bar or decimal point key, as will be readily understood.

The provision for adjustment of the adder A longitudinally of the paper-carriage not only enables a single column of figures to be printed at any desired point transversely of the sheet of paper, but permits the printing of several columns successively, side by side, and the addition of the amounts in all of them upon the adder. Where, however, it is desired to carry out the same memoranda into several amounts in different columns it will be more convenient to provide the machine with a corresponding number of adders A located side by side upon and adjustable or non-adjustable longitudinally of the paper carriage. The adders A are comparatively inexpensive and may be readily put in place upon and removed from the paper-carriage, so that each machine may be conveniently provided with extra adders for use when necessary.

In its details the adder A may be of any suitable construction, the only essential being that it be provided with driving pinions adapted to be successively engaged with the sector, and with suitable transfer devices in-



intermediate its registering wheels so as to totalize the amounts added upon them. In the present instance the pinions 214 mesh with intermediate gear wheels 261, Figs. 10, 11, 12 and 13, which in turn mesh with pinions 262 fast upon the sides of the registering wheels 213. The movement imparted to each pinion 214 by the sector is thus transmitted directly to the corresponding registering wheel 213. Each intermediate gear is provided upon its left hand side with a ratchet 263 engaged by a roller carried by the inner end of a spring pressed arm 264, which serves to aline the registering wheels, with their numbers properly exposed at the slight opening in the top of the casing, and also to prevent backward movement of the parts. The transfer pawls 265 also cooperate with the ratchets 263, there being one of such pawls for each registering wheel except the units wheel, and located between the intermediate gears 261 of the respective wheels. These transfer pawls are pivoted at their lower ends to the front ends of levers 266 whose rear ends project between and beside latch arms 267 hung at their upper ends upon a rod 268 and pressed forward at their lower ends by springs 269 and provided with beveled shoulders or hooks adapted to catch under lateral projections or lugs 270 upon the rear ends of the pawl levers 266 and support the rear ends of said levers in elevated position, as in Fig. 10, against the stress of springs 271 tending to press the front ends of the levers upward and depress their rear ends. The transfer pawls 265 are provided with forward extensions at their lower ends, against studs 272 upon which the outer ends of the springs 271 bear and thereby serve not only to press the front ends of the levers 266 upward but to press the upper ends of the pawls 265 inward and maintain them in engagement with the ratchets 261. Each of the depending latch arms 267 is provided upon its forward side with a beveled tooth or projection 273, Fig. 11, normally projecting into the path of travel of two diametrically opposite pins 274 upon the adjacent ratchet 261, with the result that at each half revolution of such ratchet the latch arm 267 will be swung rearward and its lower end be disengaged from the lever 266 which carries the pawl 265 cooperating with the ratchet wheel of next higher denomination, thereby releasing said pawl and permitting its spring 271 to throw it upward and cause it to turn such registering wheel one step or unit of distance. The upward movement of the pawl is limited by contact with a rod 275 extending transversely across the forward side of the intermediate gears, and which also serves, owing to the beveled upper end of the pawl, to lock the pawl in engagement with the ratchet and prevent any overthrow of the latter. The pinions 214 and 262 have ten

teeth each, while the intermediate gears 261 have twenty teeth each, so that each full revolution of the pinion 214 imparts a half revolution to the corresponding intermediate gear, and the latter imparts a full revolution to the corresponding registering wheel. Hence at the complete revolution of each registering wheel the transfer devices will add one unit to the registering wheel of next higher denomination.

It will be understood that in the position of the parts shown in Fig. 11 the rear pin 274 upon the ratchet 261 has swung the latch arm 267 rearward to its limit of movement but has not cleared the point of the tooth 273 upon said arm, and is still holding said arm in rearward position. As soon as the pin clears the point of the tooth (which it does before the parts come to rest with the registering wheel which is geared to said ratchet in zero position) the latch arm will be swung forward to normal position in contact with a suitable rod 283. When the rear end of the pawl lever 266 is subsequently lifted its projecting lug 270 will ride upward over the beveled forward surface of the hook of the latch arm and press the latter rearward until it clears the point of the hook, whereupon the latter will spring forward under the projection 270 upon the lever and support the latter in normal position. For the purpose of thus lifting the transfer pawl levers 266 to normal position after each operation of the device I provide resetting means for such levers which is actuated at each operation of the line-spacing mechanism of the typewriter. As shown in Fig. 5, the line-spacing lever 101 is provided upon its under side with a gear-toothed sector 276 which meshes with a pinion 277 fast upon the side of a cam 278 which cooperates with a roller 279 carried by the rear end of a lever 280 which has depending from its front end a link 281 connected at its lower end to the side arm of a bail 282, Fig. 4, whose cross bar extends entirely across the machine in the position relatively to the adding device shown in Figs. 10 and 11. At each operation of the line-spacing lever 101, therefore, the rear end of the lever 280 is depressed and the bail 282 swung upward, thereby returning to normal position all of the pawl levers 266 which have been released and thrown downward by their springs at the preceding operation, and causing their lugs 270 to be reengaged by the hooks of the latch arms 267.

To permit the bail 282 to be swung upward and the transfer pawls reset without moving the platen roller and advancing the paper, when desired, I provide a lever 101<sup>a</sup> adjacent the lever 101, Fig. 5, whose front end is adapted to be thrown forward beneath a stud 101<sup>b</sup> upon the side of the pawl 102 when the rear end of the lever 101<sup>a</sup> is



pressed forward toward the lever 101, and thereby prevent the pawl from engaging the ratchet 103 when the two levers are then swung rearward together to operate the pawl-restoring bail 282.

Each of the ratchets 263 has pivoted to it a spring-pressed pawl 284, Fig. 11, which co-operates with the longitudinal groove in the shaft 207 upon which said ratchets and the intermediate gears are mounted. By turning this shaft forward, in the direction in which the registering wheels normally turn, therefore, all of the registering wheels may be picked up and carried forward to initial or zero position by a complete revolution of the shaft, in the usual manner of such resetting devices.

Having thus fully described my invention, I claim

1. The combination with the transversely movable paper-carriage and the regular type-keys and printing devices of a typewriter, of a supplemental series of adding keys arranged to actuate the printing devices of the corresponding type-keys, an adding mechanism, and locking connections arranged to be operated by the adding keys and constructed to positively lock together the printing and adding devices in adding and insure under all conditions the adding together of the amounts printed by the operation of said keys, substantially as described.

2. In an adding typewriter, the combination with the transversely movable paper-carriage and the regular type-keys, and printing devices of the typewriter, of a supplemental series of adding keys, means arranged to be shifted upon the downward movement of the adder keys for positively locking together said keys and the printing devices of the corresponding type-keys in adding, but so as to leave the latter normally free to be operated independently of the adding keys, and an adding mechanism and connections operated by the adding keys and constructed to insure the adding together of the amounts printed by the operation of said keys, substantially as described.

3. In an adding typewriter, the combination, with the transversely movable paper-carriage and the regular type-keys and printing devices of the typewriter, of a supplemental series of adding keys means to lock the adding keys positively with the corresponding type-keys to cause the latter to actuate their printing devices when the adding keys are operated, but leaving them normally free to independently actuate their printing devices when the adding devices are not operated, and an adding mechanism operated by the adding keys to add together the amounts printed by the operation of said keys, substantially as described.

4. In an adding typewriter, the combina-

tion, with the transversely movable paper-carriage and the regular type-keys and printing devices of the typewriter, of a supplemental series of adding keys, automatic locking devices to positively connect the adder keys with and to severally depress the corresponding type-keys to actuate their printing devices, but leaving the type-keys normally free to be depressed independently of the adding keys, to actuate said printing devices, and an adding mechanism operated by the adding keys to add together the amounts printed by the operation of said keys, substantially as described.

5. In an adding typewriter, the combination, with the transversely movable paper-carriage and the regular type-keys and printing devices of the typewriter, of a supplemental series of adding keys, means for automatically and positively locking the adding keys to the corresponding type-keys when the adding keys are operated, to compel said keys to move in unison during the operation of the adding keys, and an adding mechanism operated by the adding keys to add together the amounts printed by the operation of said keys, substantially as described.

6. In an adding typewriter, the combination, with the transversely movable paper-carriage and the regular type-keys and printing devices of the typewriter, of a supplemental series of adding keys, means operating upon the depression of any adding key to positively lock together said key to the corresponding type-key and compel the two keys to move together during the further downward and upward movement of the adding key, and an adding mechanism operated by the adding keys to add together the amounts printed by said keys, substantially as described.

7. The combination with typewriter and adder keys of a combined typewriter and adder, of means arranged to be shifted on depressing an adder key for automatically and positively locking the two keys together in adding.

8. The combination with the typewriter and adder keys of a combined typewriter and adder, of means for positively locking the two keys together on depressing an adder key to compel them to descend in unison, said means constructed to permit the typewriter keys to be depressed independently of the adder keys.

9. In an adding typewriter, the combination, with the transversely movable paper-carriage and the regular type-keys and printing devices of the typewriter, of a supplemental series of adding keys, means operating upon the depression of any adding key to automatically couple and lock said key to the corresponding type-key and compel them to move together during the further downward and upward movement of the



adding key, means for compelling full strokes of the adding keys when operated, and an adding mechanism operated by the adding keys to add together the amounts printed by the operation of said keys, substantially as described.

10. In an adding typewriter, the combination of a type-bar, a type-key and connections for operating said bar, an adding key and locking devices cooperating with the type-key to depress the same when the adding key is depressed, but permitting depression of the type-key independently of the adding key, the typewriter carriage, and an adding mechanism on said carriage operated by the adding key, substantially as described.

11. In an adding typewriter, the combination of a type-bar, a type-key and connections for operating the same, an adding key, means for automatically locking the adding key and type-key together upon the depression of the adding key, but permitting depression of the type-key independently of the adding key, and an adding mechanism operated by the adding key, substantially as described.

12. In an adding typewriter, the combination of a type-bar, a type-key and connections for operating the same, a depressible adding key located adjacent the type-key, a locking device interposed between the type-key and adding key and operating automatically to lock the two keys together at the beginning of the downward movement of the adding key and to uncouple them at the end of the upward movement of the adding key, and an adding mechanism operated by the adding key, substantially as described.

13. In an adding typewriter, the combination of a type-bar, a type-key and connections for operating said bar, a depressible adding key located adjacent the type-key, a locking device carried by the adding key and cooperating with the type-key to lock the two keys together at the beginning of the downward movement of the adding key and to unlock them at the end of the upward movement of the adding key, and an adding mechanism operated by the adding key, substantially as described.

14. In an adding typewriter, the combination of a type-bar a type-key and connections for operating said bar, a depressible adding key adjacent the type-key, a hook-lock carried by the adding key and adapted to automatically engage a stud or projection upon the type-key at the beginning of the downward movement of the adding key to lock the two together and to be disengaged therefrom at the end of the upward movement of said key, and an adding mechanism operated by the adding key, substantially as described.

15. In adding typewriters, the combination of the type-bar 13, the depressible type-

key 1 and connections for operating said bar, said key being provided with the lateral projection or stud 253, the adding key 230 located adjacent the type-key, the bell-crank 252 carried by the adding key and provided with the hooked upper end adapted to cooperate with the stud 253 on the type-key, the stop 255 cooperating with the horizontal arm of the bell-crank to disengage the hook from the stud at the end of the upward movement of the adding key, and an adding mechanism operated by said adding key, substantially as described.

16. In adding typewriters, the combination of the type-bar 13, vertically reciprocating rod 2, connecting wire 12, type-key 1 carried by the rod 2 and provided with the stud 253, adding key 230, bell-crank 252 having the hooked upper end cooperating with the stud 253, the stop 255 cooperating with the horizontal arm of the bell-crank, and an adding mechanism operated by said adding key, substantially as described.

17. In adding typewriters, the combination of a type-bar, a type-key and connections for operating said bar, an adding key, means for automatically coupling the two keys together upon the operation of the adding key, a complete stroke device cooperating with said adding key, and an adding mechanism operated by the adding key, substantially as described.

18. In adding typewriters, the combination of a type-bar, a type-key and connections for operating said bar, a depressible adding key located adjacent said type-key, means operating at the depression of the adding key to automatically couple the two keys together, a complete stroke device cooperating with the adding key, and an adding mechanism operated by the adding key, substantially as described.

19. In adding typewriters, the combination of a type-bar, a type-key 1 and connections for operating said bar, a depressible adding key 230 located adjacent said type-key and provided with the ratchet 247 and studs 248 249, a latch or coupling device intermediate said keys for automatically coupling them together at the depression of the adding key, the bell-crank pawl 246 cooperating with the ratchet 247 and studs 248 249, and the spring 251 for holding said pawl in its opposite positions, substantially as described.

20. In adding typewriters, the combination, with the paper-carriage, of a series of adding keys, an adder-actuating means operated by said keys and located in fixed position relatively to the transverse movements of the paper-carriage, and an adding device mounted upon and adjustable longitudinally of the paper-carriage and provided with pinions adapted to be successively engaged with said actuating means, substantially as described.



21. In adding typewriters, the combination, with the paper-carriage of the typewriter, of an adding device mounted upon and carried by said paper-carriage, a series of adding keys, an adder-actuating gear common to said keys, and means operated by said adding keys for engaging said gear with a pinion of the adding device and moving it while in gear therewith a distance proportionate to the value of the key, and then withdrawing it from engagement with the pinion to permit free movement of the adding device with the paper-carriage, substantially as described.

22. In adding typewriters, the combination, with the paper-carriage of the typewriter, of an adding device mounted upon and carried by said paper-carriage, a series of depressible adding keys, an adder-actuating gear, means operated by said adding keys for engaging the gear with one of the adder pinions and moving it while in engagement therewith a distance proportionate to the value of such key, at the down stroke of such key, and for disengaging it therefrom and permitting it to return to normal position independently thereof at the return up stroke of the key, substantially as described.

23. In adding typewriters, the combination, with the paper-carriage of the typewriter, of an adding device mounted upon and adjustable longitudinally of the paper-carriage, a series of adding keys, an adder-actuating device located in fixed position relatively to the transverse movements of the paper-carriage, and means operated by the adding keys to engage said actuating device with a pinion of the adding device and to move it while in gear therewith a distance proportionate to the value of said key, and to then withdraw it from engagement with the pinion to leave the latter and the adding device free for movement with the paper-carriage, substantially as described.

24. In adding typewriters, the combination, with the paper-carriage of the typewriter, of an adding device mounted upon and adjustable longitudinally of the paper-carriage, a series of depressible adding keys, an adder-actuating gear, means operated by said adding keys for engaging the gear with one of the adder pinions and moving it while in engagement therewith a distance proportionate to the value of such key, at the down stroke of such key, and for disengaging it therefrom and permitting it to return to normal position independently thereof at the return upstroke of the key, substantially as described.

25. In adding typewriters, the combination, with the line-spacing mechanism of the typewriter, and an adding device provided with transfer or carrying devices intermediate the wheels of different denominations, of means for restoring said transfer de-

vices to normal position at each operation of the machine.

26. In adding typewriters, the combination, with the line-spacing mechanism of the typewriter, and an adding device provided with spring actuated transfer or carrying pawls intermediate its wheels of different denominations, of means operated by the line-spacing mechanism to restore said pawls to normal position at each operation of such mechanism, substantially as described.

27. In adding typewriters, the combination, with the paper-carriage and an adding device mounted thereon and provided with transfer or carrying devices intermediate its wheels of different denominations, of the line-spacing mechanism and means operated thereby for restoring said transfer devices to normal position at each operation of such mechanism, substantially as described.

28. In adding typewriters, the combination, with the paper-carriage and an adding device mounted thereon and provided with spring actuated transfer or carrying pawls intermediate its wheels of different denominations, of the line-spacing mechanism of the machine and means operated thereby to restore said pawls to normal position at each operation of said mechanism, substantially as described.

29. In adding typewriters, the combination, with the paper-carriage and an adding device mounted thereon and provided with transfer or carrying devices intermediate its wheels of different denominations, of a movable rod or bar extending longitudinally of the paper-carriage and cooperating with the transfer devices of the adder to restore the same to normal position, the line-spacing mechanism, and a connection between the same and said bar for operating said bar, substantially as described.

30. In adding typewriters, the combination with the paper-carriage and an adding device mounted thereon and provided with spring actuated transfer or carrying pawls intermediate its wheels of different denominations, of a swinging bail mounted upon the paper-carriage and extending longitudinally thereof in proximity to the adding device, the line spacing mechanism and a connection between the same and said bail for operating the bail to reset the transfer pawls at each operation of said mechanism, substantially as described.

31. In adding typewriters, the combination of the paper-carriage, an adding device A mounted upon said paper-carriage and containing the pawl-carrying levers 266, the spring-pressed transfer pawls 265 carried by said levers, the latches 267 for holding said levers and pawls in normal position, the swinging bail 282 cooperating with the pawl levers 266, the line-spacing mechanism and a connection between the same and said bail



for operating said bail to restore the levers 266 and pawls 265 to normal position at each operation of said mechanism, substantially as described.

5 32. In adding typewriters, the combination, with the paper-carriage and the adding device mounted thereon and provided with transfer or carrying devices intermediate its wheels of different denominations, of the  
10 swinging bail 282 mounted upon the paper-carriage and cooperating with said transfer devices, the lever 280 connected to said bail, the line spacing mechanism and the cam 278 cooperating with the lever 280 and operated  
15 by the lever 101 of the line-spacing mechanism, substantially as described.

33. In adding typewriters, the combination, with an adding device provided with transfer or carrying devices intermediate its  
20 wheels of different denominations, of the line-spacing mechanism and means operated by the lever thereof for restoring said transfer devices to normal position at each operation of said mechanism, and means for disconnecting said lever at will from the line-spacing mechanism to permit operation of it to  
25 reset the transfer devices without actuating the spacing mechanism, substantially as described.

30 34. In adding typewriters, the combination, with the paper-carriage and an adding device mounted thereon and provided with transfer or carrying devices intermediate its wheels of different denominations, of the  
35 line spacing mechanism and means operated thereby for restoring said transfer devices to normal position at each operation of such mechanism, and means for disconnecting said lever at will from said line-spacing  
40 mechanism to permit operation of it to reset the transfer devices without actuating the spacing mechanism, substantially as described.

35. In adding typewriters, the combination, with the paper-carriage and an adding  
45 device mounted thereon and provided with transfer or carrying devices intermediate its wheels of different denominations, of a swinging bail extending longitudinally of the  
50 paper-carriage in proximity to the adding device, the line spacing mechanism, a connection between said bail and the actuating lever of the line-spacing mechanism for operating the bail by means of said lever to re-  
55 set the transfer pawl at each operation of the line-spacing mechanism, and means for disconnecting said lever from the line-spacing mechanism at will to permit operation of it to reset the transfer devices without actu-  
60 ating the spacing mechanism, substantially as described.

36. In adding typewriters, the combination, with the paper-carriage, its platen  
65 roller provided with a ratchet, and an actuating lever and pawl cooperating with said

ratchet to turn the roller and advance the paper, of an adding device provided with transfer or carrying devices intermediate its wheels of different denominations, means  
operated by said lever for restoring said 70 transfer devices to normal position at each operation of said lever, and means for preventing at will the engagement of the pawl with the ratchet when the lever is operated, whereby the transfer devices may be reset 75 without turning the platen roller, substantially as described.

37. In adding typewriters, the combination, with the paper-carriage, the platen  
80 roller provided with a ratchet, and a lever and pawl cooperating with said ratchet to turn the roller and advance the paper, of an adding device mounted upon the paper-carriage and provided with transfer or carrying  
85 devices intermediate its wheels of different denominations, of a swing bail extending longitudinally of the paper-carriage in proximity to the adding device, a connection between said bail and lever for operating the  
90 bail by means of the lever to reset the transfer pawls at each operation of said lever, and means for preventing at will the engagement of the pawl with the ratchet at the operation of the lever, for the purpose de-  
95 scribed.

38. In adding typewriters, the combination, with the paper-carriage, its platen roller  
provided with the ratchet 103, and the lever 101 carrying the pawl 102 cooperating with  
100 said ratchet to return the roller, of an adding device provided with transfer or carrying devices intermediate its wheels of different denominations, means operated by the lever 101 for restoring said transfer devices to normal  
105 position at each operation of said lever, and the lever 101<sup>b</sup> cooperating with the lever 101 and its pawl 102 to prevent engagement of said pawl with the ratchet 103 when said levers are operated together, substan-  
110 tially as and for the purpose described.

39. In adding typewriters, the combination, with the paper-carriage, of the adding  
device A mounted to slide longitudinally upon said paper-carriage, the screw rod 206,  
115 and means for connecting the adding device to and disconnecting it from said screw rod, whereby it may be adjusted longitudinally of the paper-carriage both independently of and by means of said rod, substantially as  
120 described.

40. In adding typewriters, the combination, with the paper-carriage, of the adding  
device A mounted to slide longitudinally upon said paper-carriage, the screw rod 206,  
125 the lever 211 carried by the adding device and cooperating at one end with said rod, and the flattened rod 208 cooperating with the opposite end of said lever, substantially as described.

41. In adding typewriters, the combina- 130



tion of the paper-carriage, the rods 206 207 and 208 mounted at their opposite ends therein, the adding device A mounted at its front and rear sides upon the rods 206 and 208 and having a set of its wheels mounted upon the grooved rod 207, the lever 211 carried by the adding device and cooperating at its rear end with the screw rod 206 and at its front end with the flattened rod 208, and the pawls carried by the wheels of the adder and cooperating with the longitudinal groove in the rod 207 to cause the turning of said rod to carry said wheels to initial position, substantially as described.

42. In an adding mechanism, the combination of a series of reciprocating adding keys, a series of cams of different pitch geared to the respective keys, so as to be turned by the reciprocations of the keys, and an adder-actuated device operated by said cams and given different degrees of movement thereby proportionate to the values of the respective keys, substantially as described.

43. In an adding mechanism, the combination of a series of reciprocating adding keys, a series of cams of different pitch geared to the respective keys, so as to be turned by the reciprocations of the keys, and an adder-actuating device operated by said cams and given different positive degrees of movement thereby proportionate to the values of the respective keys, substantially as described.

44. In an adding mechanism, the combination of a series of reciprocating adding keys, a series of cams of different pitch geared to the respective keys, so as to be turned by the reciprocations of the keys, a pivoted frame cooperating with said cams and given different degrees of movement thereby proportionate to the values of the respective keys, and an adder-actuating gear carried by said frame, substantially as described.

45. In an adding mechanism, the combination of a series of reciprocating adding keys, a series of hooked or slotted cams of different pitch geared to the respective keys, so as to be turned by the reciprocations of the keys, and an adder-actuating device cooperating with said cams and with the slotted or hooked tails thereof, whereby said device is given different degrees of movement by the different cams and locked thereto at the end of such movements, substantially as described.

46. In an adding mechanism, the combination of a rocking frame carrying an adder-actuating gear and provided with a series of laterally projecting studs, a series of reciprocating adding keys, and a series of cams of different pitch geared to the respective keys and cooperating with the studs upon the rocking frame, and provided with slots engaging said studs at the ends of the movements of the cams to lock the rocking frame

thereto to impart positive movements, substantially as described.

47. In an adding mechanism, the combination of the rocking frame B carrying the actuating gear or sector 215 and provided with the studs 237, the reciprocating keys 230, and the cams 236 geared to the respective keys and cooperating with the studs 237 on said rocking frame, substantially as described.

48. In an adding mechanism, the combination of the rocking frame B carrying the actuating gear or sector 215 and provided with the studs 237, the reciprocating keys 230, and the cams 236 geared to the respective keys and provided with the hooked tails 236<sup>a</sup> and cooperating with the studs 237 on said rocking frame, substantially as described.

49. In an adding mechanism, the combination of an adding device provided with a driving pinion, a reciprocating actuating gear engageable with and disengageable from said pinion, a series of reciprocating adding keys, and means intermediate said keys and gear operating at the downward stroke of a key to engage the gear with the pinion and move it while in engagement therewith a distance proportionate to the value of such key, and to disengage it therefrom and permit it to return to initial position at the upward stroke of the key, substantially as described.

50. In an adding mechanism, the combination of an adding device provided with a driving pinion, a reciprocating actuating gear engageable with and disengageable from said pinion, a series of reciprocating adding keys, a series of cams of different pitch geared to the respective keys and cooperating with the actuating gear to move the latter different distances proportionate to the values of the operated keys, and means operated by said keys for engaging said gear with the pinion of the adding device at the beginning of the downstroke of the keys and disengaging it therefrom at the beginning of the return up stroke of the keys, substantially as described.

51. In an adding mechanism, the combination of an adding device provided with a driving pinion, a vertically and horizontally reciprocating actuating gear cooperating with said pinion, a series of adding keys, and two sets of cams operated by said keys and cooperating with said actuating gear, one set of cams operating to engage the actuating gear with the pinion of the adding device at the beginning of the down stroke of the adding key and to disengage it therefrom at the beginning of upstroke of said key, and the other set of cams operating to impart different degrees of movement to the actuating device while in gear with the adding pinion, substantially as described.



52. In an adding mechanism, the combination, with the pinion 214 of the adding device, of the bell-crank frame C provided with the transverse rod 225, the rocking frame B supported in the upper ends of said bell-crank frame and carrying the actuating gear 215 cooperating with the adding pinion 214, and provided with the studs 237, the springs 228 connected to said frame, the adding keys 230, the cams 236 geared to said keys and cooperating with the studs 237, and the cam disks 240 cooperating with the rod 225 of the bell-crank frame and shifted in opposite directions by the pawls 242 243 upon the adding keys, substantially as described.

53. In an adding mechanism, the combination of the rocking frame B carrying the vertically reciprocating gear 215 and provided with the studs 237, the reciprocating adding keys 230 provided with the ratchet teeth 247, the cams 236 geared to the keys 230 and cooperating with the studs 237, the bell-crank pawls 246 cooperating with the ratchet teeth 247 and with the studs 248 249 upon the adding keys, and the springs 251 for holding the pawls 246 in their opposite positions, substantially as described.

54. In an adding mechanism, the combination of the bell-crank frame provided with the rod 225, the rocking frame pivoted at its forward end in the upper end of said bell-crank frame and carrying at its rear end the actuating gear 215, the springs 228 connected to the front end of said rocking frame, the reciprocating adding keys 230 provided with the ratchet teeth 247 and studs 248 249, the cams 236 geared to the respective keys 230 and provided with the hooked tails 236<sup>a</sup> and cooperating with the studs 237 on the rocking frame, the cam disks 240 cooperating with the rod 225 of the bell-crank frame, the springs 245 for holding said cam disks in their opposite positions, the spring-pressed pawls 242 243 carried by the keys 230 and cooperating with the disks 240 to shift the latter in opposite directions, the bell-crank pawls 246 cooperating with the ratchet teeth 247 and with the studs 248 249 on the keys 230, and the spring 251 for holding the pawls 246 in their opposite positions.

55. The combination with a typewriter involving finger operated numeral keys, of computing mechanism comprising a bank of finger-operated digit keys, with finger pieces exposed where they may be struck by the fingers, and connections whereby to lock positively together the numeral keys of the typewriter and the corresponding digit keys of said computing mechanism which connections prevent any independent movement of the two in adding and recording, but are automatically separable to permit a record without adding.

56. The combination with the transversely

movable paper carriage and the regular type-keys and printing devices of a typewriter, of a supplemental series of adding keys arranged to actuate by the adding keys the printing devices of the corresponding type-keys, an adding mechanism, and connections for positively coupling the two keys and operated by the adding keys and constructed to insure under all conditions the adding together of the amounts printed.

57. In an adding typewriter, the combination with the transversely movable paper carriage and the regular type-keys and printing devices of the typewriter, of a supplemental series of adding keys, means for automatically locking the adding keys to the corresponding type-keys when the adding keys are operated, to compel said keys to move in unison during the operation of the adding keys, means to insure the completed movement of the adding mechanism, and an adding mechanism operated by the adding keys to add together the amounts printed by the operation of said keys, substantially as described.

58. The combination in an adding typewriter, of typewriting and adding mechanisms, a supplemental series of numeral keys, means for locking each of said keys positively with the corresponding numeral mechanism of the typewriter, to insure the movement of the adding mechanisms corresponding to the amount indicated by the key depressed, substantially as set forth.

59. The combination in an adding typewriter of typewriting and adding mechanisms, a supplemental series of numeral keys, means for locking each of said keys automatically and positively with the corresponding numeral mechanism of the typewriter to insure the movement of the typewriting mechanism corresponding to that of the adding mechanism.

60. The combination in an adding typewriter, of type-writer and adding keys, an adding mechanism, actuating means for the adding mechanism, and locking connections between said adder keys and the typewriting means constructed to insure positive movements of the latter by the adder keys throughout the operation of a letter.

61. In a combined typewriter and adder, the combination of typewriting mechanism having numeral keys, adding mechanism, a second series of numeral keys, devices between said numeral typewriter keys and the adding mechanism normally out of connection with the latter, and means to make said connection on depressing any one of the second series of keys, substantially as set forth.

62. The combination in a combined typewriter and adder, of typewriter and adder numeral keys, adding mechanism carried by the typewriter carriage and means for oper-



ating said mechanism from the adder keys, substantially as set forth.

63. The combination in a combined typewriter and adder, of typewriter and adder numeral keys, adding mechanism supported to move with the typewriter carriage, and means for operating said mechanism and also

the typewriter printing devices from the adder keys, substantially as set forth.

JASON C. LOTTERHAND.

Witnesses:

WM. BROPHY,

WALTER B. MANNY.