N. WHITE.

PRINTING MECHANISM FOR ADDING MACHINES.

APPLICATION FILED OCT. 17, 1914.

1,229,844.

Patented June 12, 1917.

5 SHEETS—SHEET 1.

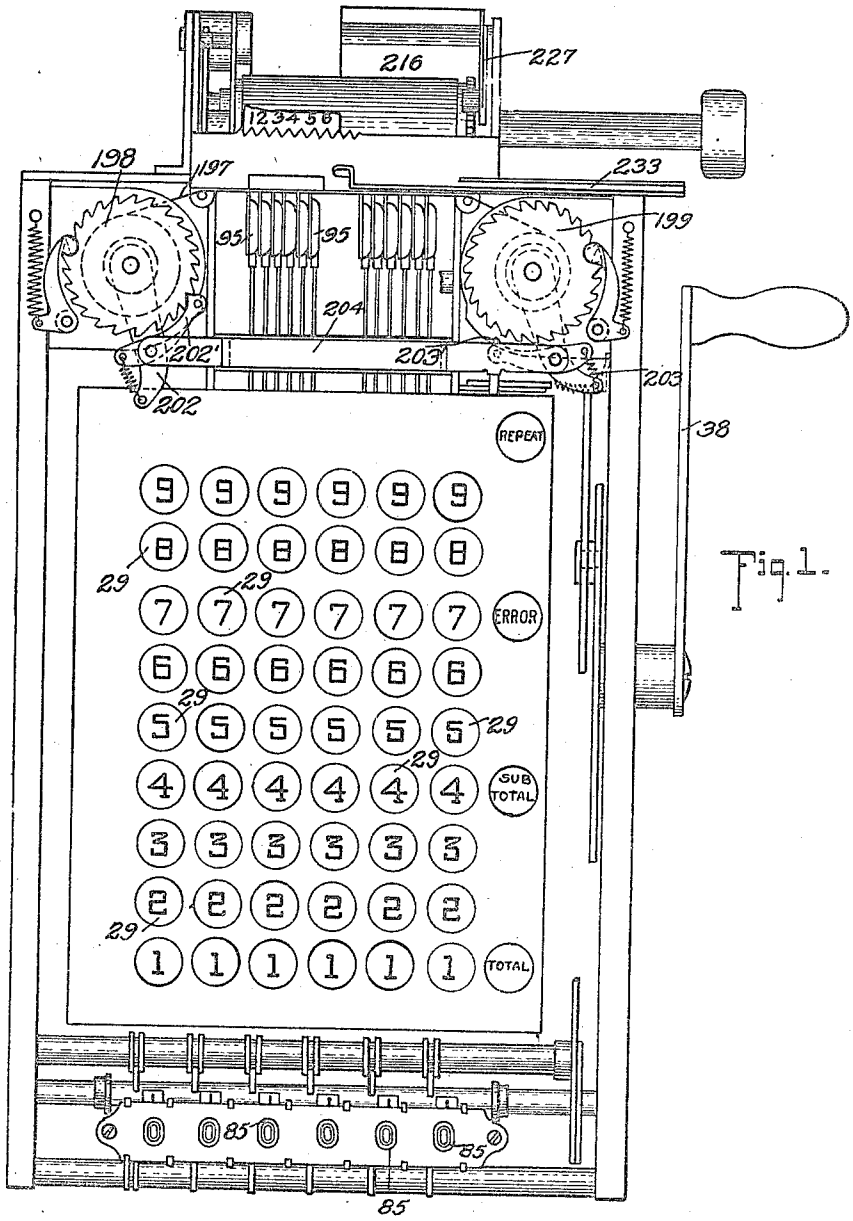


Fig. 1.

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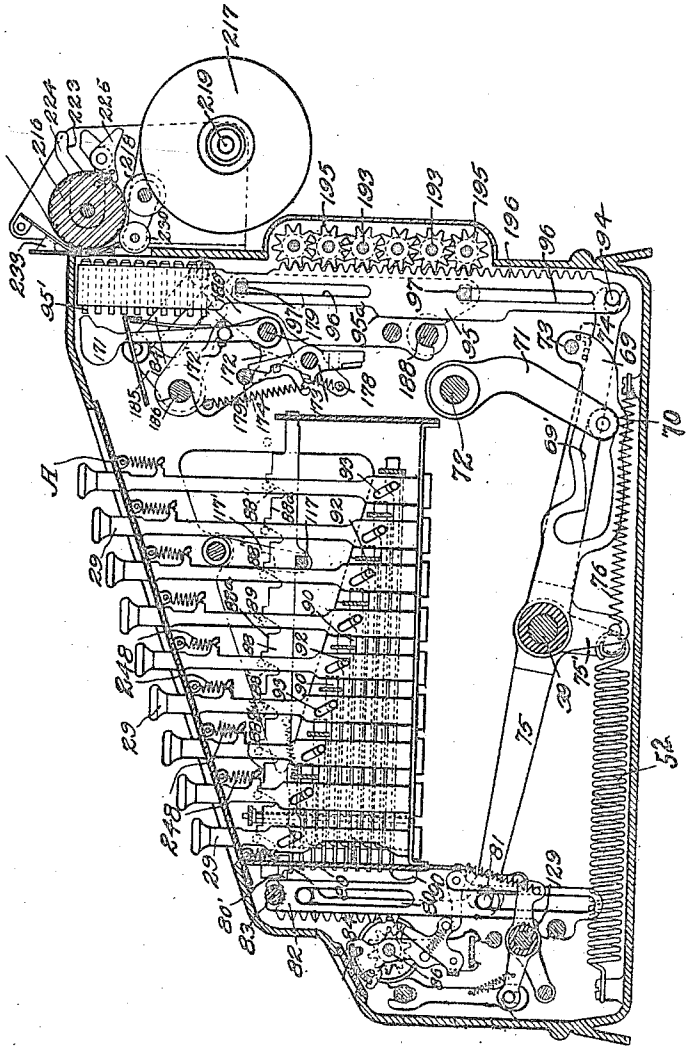


Fig. 2.

Witnesses

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Fig. 3.

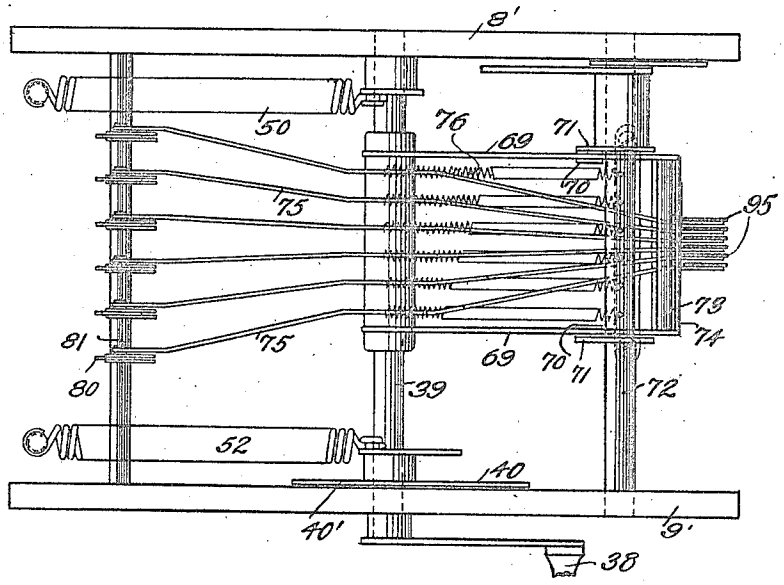
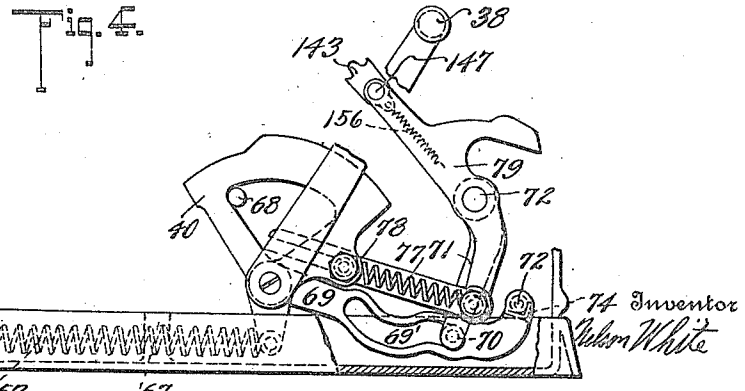


Fig. 4.



Witnesses

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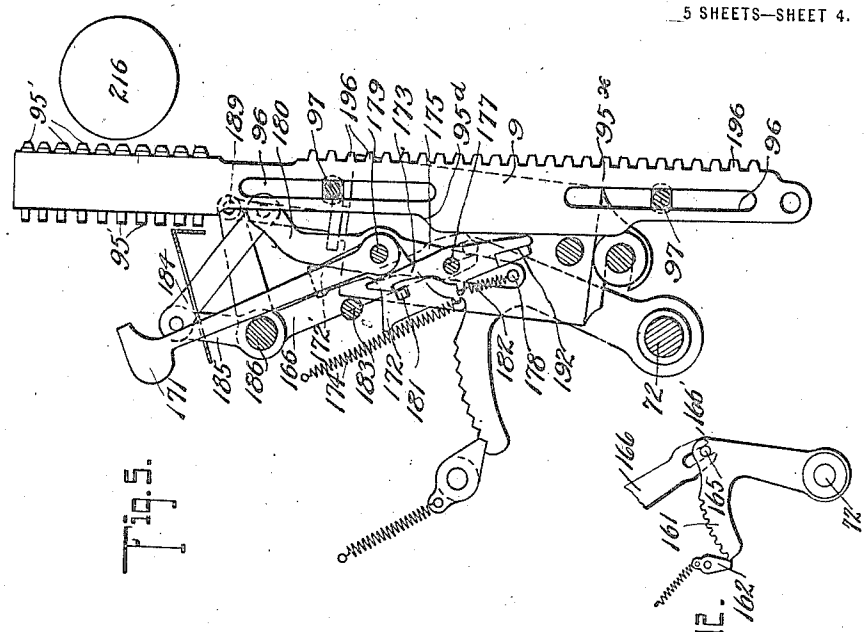


Fig. 5.

Fig. 12.

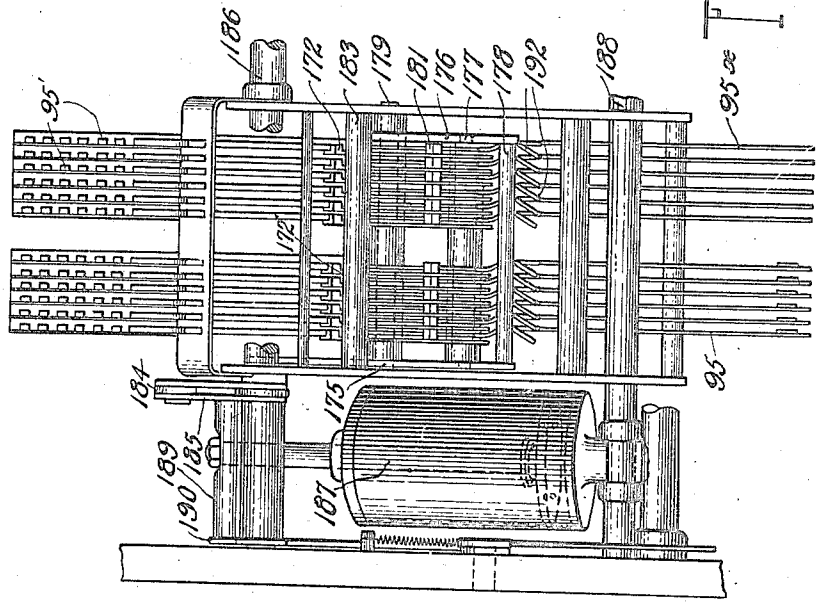


Fig. 6.

Witnesses

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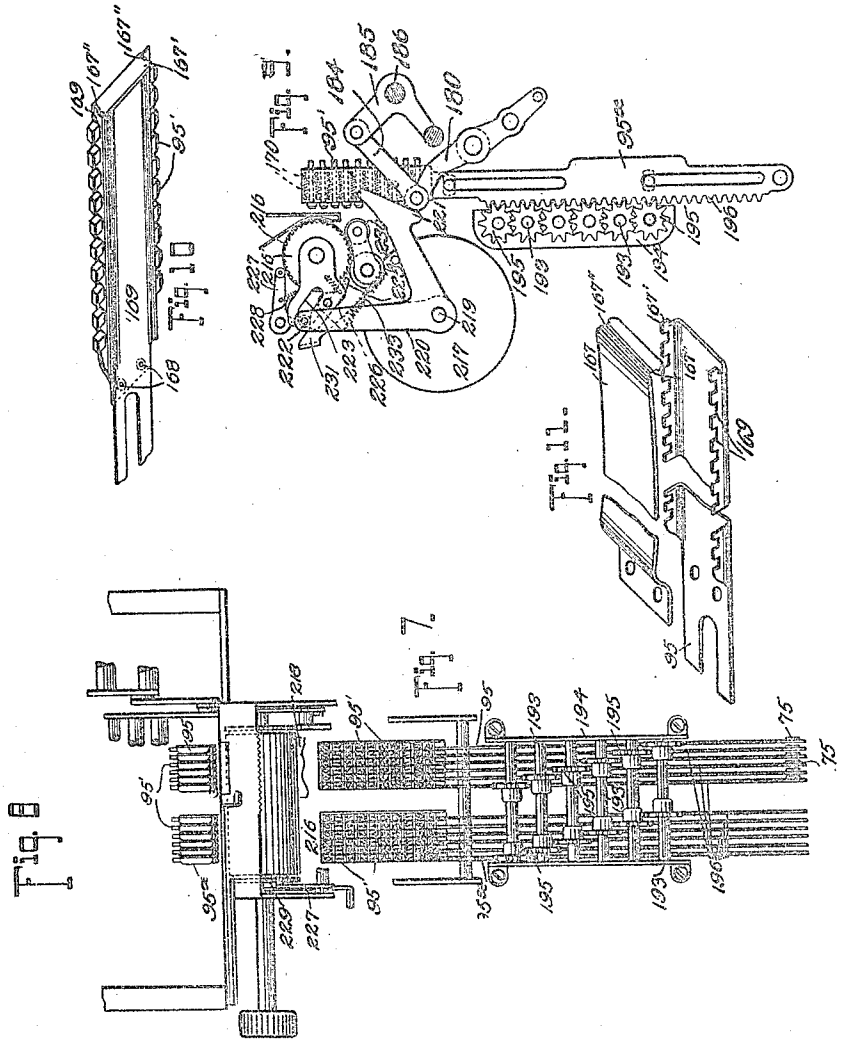
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5 SHEETS—SHEET 5.



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UNITED STATES PATENT OFFICE.

NELSON WHITE, OF SPRINGFIELD, OREGON, ASSIGNOR TO INTERNATIONAL MONEY MACHINE COMPANY, OF TERRE HAUTE, INDIANA, A CORPORATION OF INDIANA.

PRINTING MECHANISM FOR ADDING-MACHINES.

1,229,844. Specification of Letters Patent. Patented June 12, 1917.

Original application filed March 20, 1913, Serial No. 755,817. Divided and this application filed October 17, 1914. Serial No. 867,178.

To all whom it may concern:

Be it known that I, NELSON WHITE, a citizen of the United States, residing at Springfield in the county of Lane and State of Oregon, have invented certain new and useful Improvements in Printing Mechanism for Adding-Machines, of which the following is a specification.

This invention appertains to adding and listing machines and embodies primarily certain novel improvements in the listing or printing instrumentalities employed in such machines. The present application is a division of my pending application Serial Number 755,817, filed March 20, 1913, and patented July 25, 1916, numbered 1,192,721, and a continuation of the application of myself, William S. Overlin and Frank A. Bullington, Serial Number 702,164, filed June 7, 1912.

The improvements of the present invention include among other features the following: First, a peculiar arrangement or organization of the printing devices comprising type carriers, coacting hammers to impinge the type for impression purposes, hammers, drivers coacting with the hammers, and devices controlling the firing or release of the hammers by their drivers and for restoring the same, the said firing of the hammers being effected by direct coöperation between certain hammer driver restraining catches, and the type carriers; secondly, the provision of printing means auxiliary to the main printing instrumentalities, and operable from the latter, whereby the printing or recording of amounts set up in the machine may be effected in duplicate, there being provided gearing intermediate the type carriers of the main and auxiliary printing mechanisms whereby said carriers may be adjusted to the printing point in unison preparatory to the completion of the printing operation; thirdly, the provision of a suitable platen coöperative with the types of the printing instrumentalities in the actual printing operation, with feeding means for said platen and for the recording strip on which the amounts are listed by the printing devices; fourthly, the employment of special retarding means controlling the operation of the main actuator which in turn controls the action of the printing mechanism as is customary in machines of this type; and fifthly, the provision of other detail parts and arrangements of parts all with a view to subserving the general simplicity of the machine and the effectiveness and accuracy of the operations performed thereby under practical conditions of use.

In the accompanying drawings:—

Figure 1 is a top plan view of a machine embodying the invention;

Fig. 2 is a sectional view taken vertically through the machine from front to rear of the same;

Fig. 3 is a horizontal sectional view bringing out more clearly the means for operating the type carriers;

Fig. 4 is a detail view showing more clearly the connection between the handle or actuator shaft and the counter shaft controlling the movement of the type carriers and associated parts;

Fig. 5 is a vertical sectional view of the printing mechanism proper, the type carriers being illustrated in side elevation and the hammers in restrained positions;

Fig. 6 is a front view of the parts shown in Fig. 5, the frame of the machine broken away and certain parts such as springs, etc., omitted;

Fig. 7 is a rear view of the duplicate sets of type carriers and connections intermediate the same;

Fig. 8 is a fragmentary top plan view showing more clearly the parts illustrated in Fig. 9;

Fig. 9 is a view of the printing mechanism looking toward the left hand side of the machine and bringing out clearly the platen feeding devices;

Figs. 10 and 11 are detail perspective views of one of the type carriers showing the manner of joining the composite parts thereof;

Fig. 12 is a detail view bringing out more clearly the driving connection between the auxiliary or counter shaft and the shaft for shifting the frame or section supporting the hammers and coacting parts.

Referring to Figs. 2 and 3, the general construction of the present machine will be readily apparent comprising as it does the casing A inclosing the keyboard mechanism which embodies the usual amount keys 29 for setting up items on the machine prepara-

tory to the same being added and listed. The keys 29 are normally held upraised by springs 248 and have lateral pins 89 adapted to engage cams 88'' formed on locking bars 88 which slide transverse to the keys, one bar 88 being provided for each row of the keys 29, as will be readily understood. The locking bars 88 coöperate at their front ends with lugs 80' offstanding from the adding racks 80, said racks 80 being mounted between spaced plates 82 on which they are guided, and coöperating with the adding wheels 84 located at the front of the machine. The adding racks 80 are connected at their lower ends by means of studs 81, with levers 75 which are pivoted between their ends, see Fig. 3, to the shaft 39 which is the handle or actuator shaft of the machine. The levers 75 are normally acted on by springs 76 attached to arms 75' of the levers, the tendency of the springs being to pull downward on the front ends of the levers and thereby to force the adding racks downward and at the same time force upward the type carriers 95 which are jointed by studs 94 with the rear ends of said levers 75. In other words, the adding racks 80 are mounted for vertical sliding movement at the front of the machine while the type carriers 95 are similarly mounted at the rear of the machine. A large spring 52 is connected with an arm on the shaft 39 which carries the handle 38 and normally tends to hold said handle at its rearmost limit of movement as seen in Fig. 2. Furthermore the shaft 39 carries the crooked arms 69 which are connected together at their rear ends by a rod 73 and a detent bar 74, the latter adapted to engage the rear ends of the levers 75 to hold the latter normally in the position shown in Fig. 3. The arms 69 have cam slots 69' therein and a counter or auxiliary shaft 72 arranged above the rear ends of the levers 75 has downwardly extending arms 71 provided with rollers 70 operating in the cam slots 69', the coöperation of the parts being such that on pulling forward the handle 38 and consequently rocking the shaft 39 the arms 69 are raised, causing the rollers 70 to traverse the slots 69' and thereby imparting a rocking movement to the shaft 72. The shaft 72 is designed to operate certain parts of the printing mechanism for which purpose said shaft carries a vertically projecting arm 161, see Figs. 5 and 12, the arm 161 having its upper end provided with a full stroke compelling rack in the form of an extension of said arm, and having a stud 165 which engages in the lower bifurcated portion of a lever 166 which projects downwardly from a shaft 186 which will be hereinafter more fully described in respect to function and operation.

As shown in Fig. 4 a cam 40 is mounted on the shaft 39 and a flexible connection 77, 78 is provided between said cam and an arm 79 mounted on the shaft 72 whereby motion may be transmitted from the shaft 39 to the shaft 72, said motion being also transmitted to the shaft 186, previously mentioned. The lever 79 coöperates with certain totaling mechanism, not shown, for the reason that the adding and totaling features of the machine in connection with which my invention is employed do not form a part of the present invention.

Referring again especially to Fig. 2 it is to be noted that the amount keys 29 are adapted to be depressed to cause slots formed at the lower ends of said keys to operate virtually as cams on pins 92, one of which is carried by each of a series of index stops 90 provided for each row of keys. Thus on depressing a key 29 a coöperating index stop 90 is forced outward at its front end into the path of movement of the lug 89 on the corresponding rack 80 and later on when the handle 38 is operated the detent bar 74 is raised permitting downward movement of the adding rack or racks 80 a certain number of increments of movement determined by the particular index stop or stops 90 which have been operated. The indexing means will not be described in further detail as any desirable means of this type may be employed in connection with the printing mechanism hereinafter described. It suffices to say, however, that the type carriers 95 are controlled in their movements by the adding racks 80 connected to the lever 75, the latter parts being limited, of course, in their movement by the positioning of the index stops.

The type carriers of the printing mechanism have heretofore been referred to as consisting of vertically movable type bars 95 arranged in the rear portion of the keyboard section of the machine, said bars being supplied at their upper ends with the spring retracted type members 95', each type member carrying a type face at one end and having its other end arranged to be impinged by suitable impression means in the form of a type hammer. The type faces of the type members 95' are numbered from 1 to 9 consecutively and the uppermost type member has a cipher indication, as shown in Fig. 7. The printing mechanism is best shown in Figs. 2 and 5 to 11, inclusive, and each type bar is provided at its upper portion with an incasing plate 167 interlocked at its upper extremity as shown at 167' with lugs 167'' on the upper extremity of the type bar, the parts 95 and 167 being attached together by screws or other fastenings, as shown at 168. Flanges on the edges of the type bar 95 are cut out to form guide portions 169 for the type members 95' and the springs 170 coacting with the members 95'

are housed between the incasing plate 167 and the body of the type bar 95, as shown most clearly in Fig. 9 of the drawings.

A set of type bars 95 of a number corresponding with the number of rows of amount keys 29 of the keyboard is provided and with said type bars is associated a set of hammers 171 for striking the type members 95′, a set of hammer drivers 172, each connected with the adjacent hammer, a set of catches 173 of hook-like form for normally restraining the hammers under tension, and a set of springs 174 connected with the hammer drivers. The above mentioned parts are primarily supported in a frame consisting of sides 175 and 167, the lower portions of which are connected by tie rods 177 and 178. Said frame for the printing devices is rockably mounted on a shaft 179 and the left side 175 of the frame has an upwardly extending arm 180 above the shaft 179. The rod 177 constitutes an axis for the various catches 173 which are adapted to engage over lugs 181 on the coacting hammer drivers 172. The rod 178 has connected thereto a set of springs 182 which are attached also to the catches 173 and normally tend to force the latter into engagement with the lugs 181. Each hammer 171 has a head at its upper end to impinge with the adjacent end of any type member 95′ of the cooperating type carrier or bar 95 and at its lower end the hammer is loosely pivoted upon the shaft 179. Each hammer driver 172 is also pivoted on the shaft 179, the lower end of the driver being connected with its spring 174, the upper end of the driver having ears 172′ between which the body of the coöperating hammer is loosely engaged, and the intermediate portion of said part 172 being adapted to abut with the stop bar 183. There is therefore some lost motion between the ears 172′ of the driver 172 and the hammer 171 engaged thereby, to provide for the rebound of the hammers after impact with the type members 95′, the liability of blurring being thus obviated. The arm 180 of the hammer supporting frame is connected by a driving link 184 with an arm 185 of a rock shaft 186, to which shaft 186 the lever 166 before referred to is connected. A dash pot 187 or equivalent retarding device is arranged at the left of the printing mechanism, being supported upon a cross rod 188 of the frame of the machine, the plunger rod of the dash pot being attached at its upper end to a cross bar 189 mounted on rocker arms 190 attached to the shaft 186. A suitable platen 216 is arranged to coöperate with the printing members 95′ of the type carriers 95 and the tails or lower ends of the catches 173 are split to provide laterally extending stops 192, each projecting in front of the tail portion of the next adjacent catch to the left, whereby the cipher type members 95′ of type carriers 95 not operated by adjustment of the keys 29, will be printed on operation of the impression means.

With the above description in view, and bearing in mind that each type carrier 95 has an abutment 95ª at its front edge to be engaged by the tails of the catches 173 when the latter are rocked with the hammer frame rearwardly, and when the type carriers are not in their zero positions, the operation of the mechanism will be clearly understood from the following:

During the initial movement of the handle 38, those type carriers 95 which are indexed for any number above zero, will be elevated to the printing point, after which the frame 175—176 will be rocked slightly rearwards until the tails of predetermined catches 173 engage with the abutments 95ª of the elevated type carriers. Such engagement will tilt the catches 173 from the studs 181, thereby releasing the hammer drivers 172 of such catches and permitting the hammers 171 of said drivers to be fired, or operated against the previously adjusted printing members 95′. The provision of the dash pot retarder 187 governs the speed of the machine, preventing scattering of the type and violent manipulation of the handle 38. When the frame 175—176 of the printing devices is rocked back to its normal position, the catches 173 will be reëngaged with the studs 181 of the hammer drivers 172 and locked until another transaction of the machine is performed.

As shown in Figs. 5, 6, 8 and 9, a duplicate printing mechanism is provided and consists of auxiliary type carriers 95×, each of which is connected with the corresponding one of the main type carriers 95. To establish such connection, a plurality of gear shafts 193 are provided in superposed relation upon a suitable frame 194. There are two gears 195 on each shaft 193, said gears meshing with gear teeth 196 on the rear edges of the corresponding type bars 95 and 95×. That is to say, the gears 195 of the lowermost shaft engage with the units type carriers 95 and 95× of the main and auxiliary printing mechanisms. The gears of the next shaft 193 engage with the teeth on the rear edges of corresponding tens type bars of the two printing mechanisms, and so on. By reason of the intergearing of the type carriers or bars of the two printing mechanisms, whenever one of the type carriers 95 is indexed at a predetermined adjustment on movement to such adjustment, its corresponding type carriers 95× will be simultaneously adjusted. The other printing instrumentalities coöperating with the type carriers 95× are identical with those coöperating with the type carriers 95 so the operations of the main and auxiliary printing mechanisms are simultaneous and capable of making a

list or record in duplicate, which is often desirable for the printing of a check or slip placed in the machine and for printing a recording strip, which is constantly passing through the machine.

As usual in these machines a suitable inking ribbon 192 is fed between the printing members and the work, and preferably, as shown in Fig. 1, said ribbon passes around the spools 198 and 199. Said spools have toothed wheels, the teeth of which are engaged by feeding and reversing pawls 202′ and 203′, carried respectively by levers 202 and 203. The levers 202 and 203 are connected by a plate 204 which is adapted to be reciprocated through connections, not shown, intermediate the plate and the main actuator. As the details of the ribbon feeding mechanism do not constitute a part of the present invention, they are not herein described.

Platen feed mechanism.—The mechanism for feeding the roller platen 216 is shown clearly in Fig. 9 and certain parts are illustrated in Fig. 7 also. The platen 216 is arranged above the paper spool 217 which carries the roll of paper 218 that constitutes the recording strip incidentally referred to hereinbefore. Mounted upon the axis 219 of the spool is an angle lever 220, the lower arm of which is formed with a cam 221 arranged to be engaged by the arm 180 which rocks with the hammer frame. The other arm of the lever 220 is approximately vertical and carries at its upper end a roller 222 which operates in a cam slot 223 of a feed lever 224 pivoted to the axis of the platen 216. Pivoted to the lower outer portion of the feed lever 224 is a spring actuated feeding pawl 225 adapted to engage at one end with a toothed disk attached to an end of the platen, the other end or tail of the pawl being engageable by a lateral pin 226 on the vertical arm of the angle lever 220. A pivoted pressure finger 227 is mounted above the lever 220 and a spring 228 holds said lever in engagement with a star-wheel 229 on the right hand end of the platen 216, the part 227 preventing over-rotation of the platen. A feeding roll 230 coöperates with the platen and the recording strip 218 in the well-known manner and a lever 231 is arranged to be manipulated to release the feed roll from operative engagement with the strip 218 for adjustment of the latter or other purposes.

With the arrangement of parts in view as above set forth, it will be apparent that on the forward movement of the arm 180, the cam 222 moves downwardly, permitting the lever 220 to be tilted by the spring 232 connected therewith. Such movement of the lever 20 imparts upward movement to the feed lever 224 and the pawl 225 carried thereby, this action raising the pawl preliminary to engagement of the same with the next tooth of the feed disk 216′ on the platen. The above operation takes place as the handle 38 moves forwardly and on the return stroke of the handle 38, the feed lever 224 is depressed, feeding the platen forward to a predetermined point and correspondingly feeding from the machine a section of the recording strip 218. The feeding of the platen being completed through the action of the lever 224, the final lowering movement of said lever causes engagement of the tail of the feeding pawl 225 with the pin 226, thereby tilting the pawl from engagement with the disk 216′ and permitting the platen to be turned in either direction at the will of the operator.

After the keys 29 are depressed to set up a suitable amount to be added and listed by the machine, the handle 38 is pulled forward and during such initial movement, the indexed adding racks 80 move downwardly and the corresponding type carriers 95 move upwardly until said parts reach their differentially adjusted positions. Just prior to the final movement of the handle 38 completing its forward stroke, the hammer drivers are fired to complete the operation of the printing and listing mechanism. The ribbon feeding parts are also actuated at the proper time to feed the inking ribbon 197 to present a fresh portion thereof to the printing point of the type members and the platen feeding devices are correspondingly operated to perform their proper functions.

Since the printing or listing mechanisms are provided in duplicate, one of said mechanisms will record transactions of the machine on a recording strip while the other is capable of listing said transactions upon a slip, check, or other member placed in the guide 233. Springs 248, shown in Fig. 3, are connected with the keys 29 and normally tend to restore said keys when released.

Having thus described the invention, what is claimed is:

1. In printing mechanism for adding machines, the combination of type carriers, means controlling differential positioning of said type carriers, a hammer section comprising hammers coöperative with the type carriers, drivers for said hammers, means tending to actuate the drivers to cause firing of the hammers, restraining means for the hammer drivers, a frame carrying said restraining means, a platen, a feeding device for said platen, operating means including a lever to actuate said feeding device, a connection between the frame and lever, and means to actuate the lever and thereby operate the frame to effect release of the hammer drivers from the restraining means and platen feed movement.

2. In a machine of the class described, the combination of type carriers, means for

adjusting said type carriers to printing positions, a rocking frame, hammers and hammer drivers mounted on said frame, catches normally restraining said drivers and also carried by the frame, and means for rocking said frame to impart bodily movement to the catches to release the hammer drivers therefrom.

3. In printing mechanism for adding machines the combination of type carriers, means controlling differential positioning of said carriers, a hammer section comprising a pivoted frame, hammers mounted upon the axis of said frame for coöperation with the type carriers, hammer drivers co-axially mounted with respect to said hammers and interlocked with the latter, means to operate the hammer drivers for impression purposes, restraining devices for said hammer drivers also mounted on said frame, and means whereby the hammer drivers may be released from said restraining devices to effect printing action.

4. In printing mechanism for adding machines the combination of type carriers, means controlling differential positioning of said carriers, a hammer section comprising a pivoted frame, hammers mounted upon the axis of said frame for coöperation with the type carriers, hammer drivers co-axially mounted with respect to said hammers and interlocked with the latter, means to operate the hammer drivers for impression purposes, restraining devices for said hammer drivers also mounted on said frame, means whereby the hammer drivers may be released from said restraining devices to effect printing action, a platen, feeding means for said platen including a lever, connecting means between said frame and the previously mentioned operating means for causing the movement of the frame and restraining devices thereon, and means intermediate the said frame and said lever feeding device whereby the movement of the former is imparted to the latter.

5. In a machine of the class described, printing mechanism comprising a set of vertically sliding type carriers, means for operating said carriers to differentially position the same for printing action, a second set of type carriers each of which corresponds with one of the carriers of the first mentioned set, gearing operatively connecting the various corresponding carriers of the two sets aforesaid, said gearing comprising a series of superposed transmission shafts and overlapping gears on said shafts, the carriers being provided with rack portions to engage the gears, and means supporting the type carriers for sliding movement and for holding their rack portions in coöperation with the gears aforesaid including horizontally disposed guide rods, the carriers being formed with alined slots receiving said guide rods and in which the guide rods operate incident to the movement of the carriers.

6. In printing mechanism for adding machines, the combination of type carriers, means controlling differential positioning of said type carriers, a hammer section comprising hammers coöperative with the type carriers, drivers for said hammers, means tending to actuate the drivers to cause firing of the hammers, restraining means for the hammer drivers, a frame carrying said restraining means, a platen, a feeding device for said platen, operating means including a lever to actuate said feeding device, a connection between the frame and lever, means to actuate the lever and thereby operate the frame to effect release of the hammer drivers from the restraining means and platen feed movement, and retarding means including a dash pot operatively connected with the operating means for the printing mechanism whereby to control the speed of operation of the latter.

In testimony whereof I affix my signature in presence of two witnesses.

NELSON WHITE

Witnesses:

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