Feb. 18, 1930. O. J. SUNDSTRAND 1,747,743

PRINTING MECHANISM

Filed June 4, 1928 3 Sheets-Sheet 1

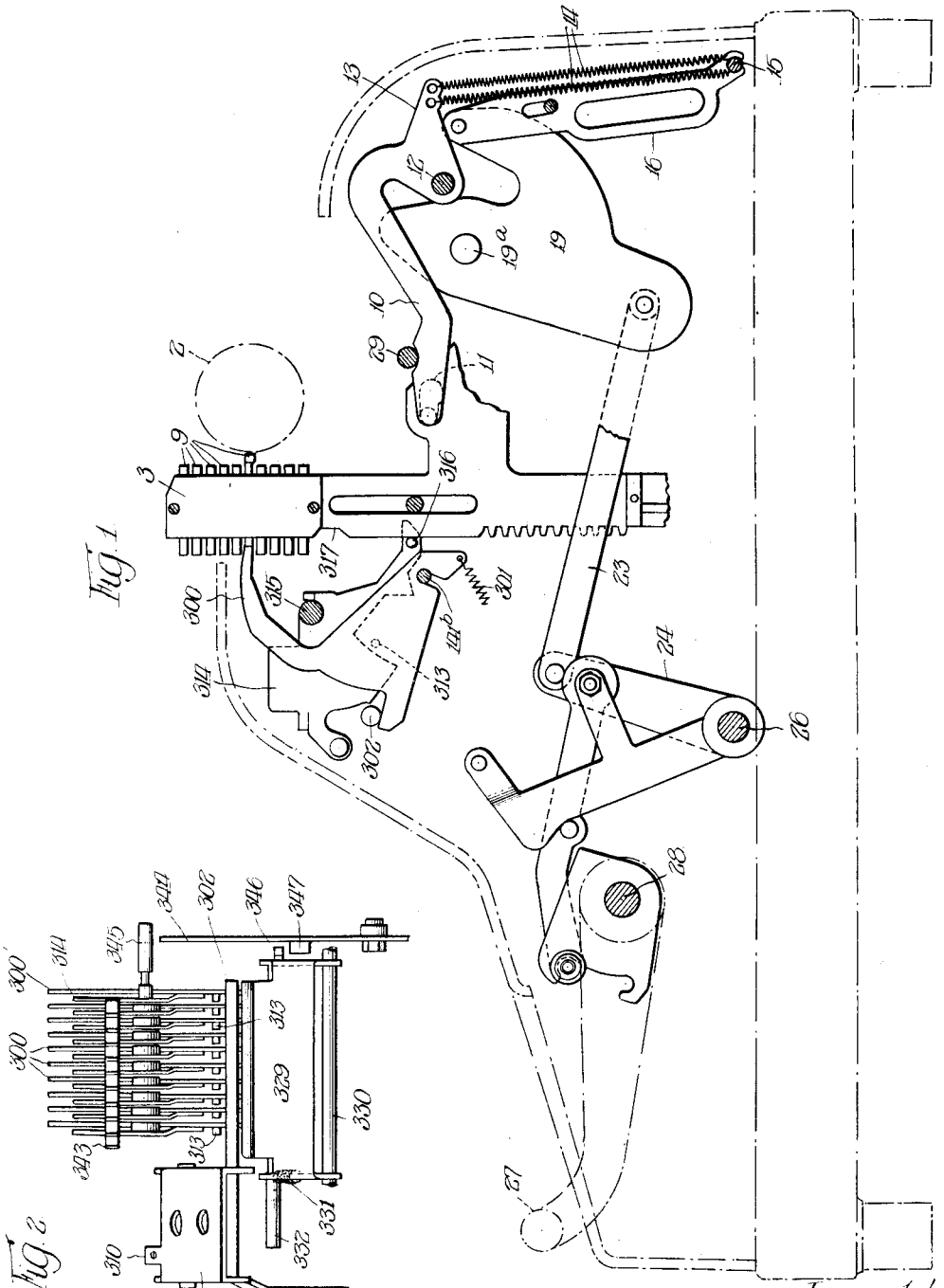


Fig. 1

Fig. 2

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PRINTING MECHANISM

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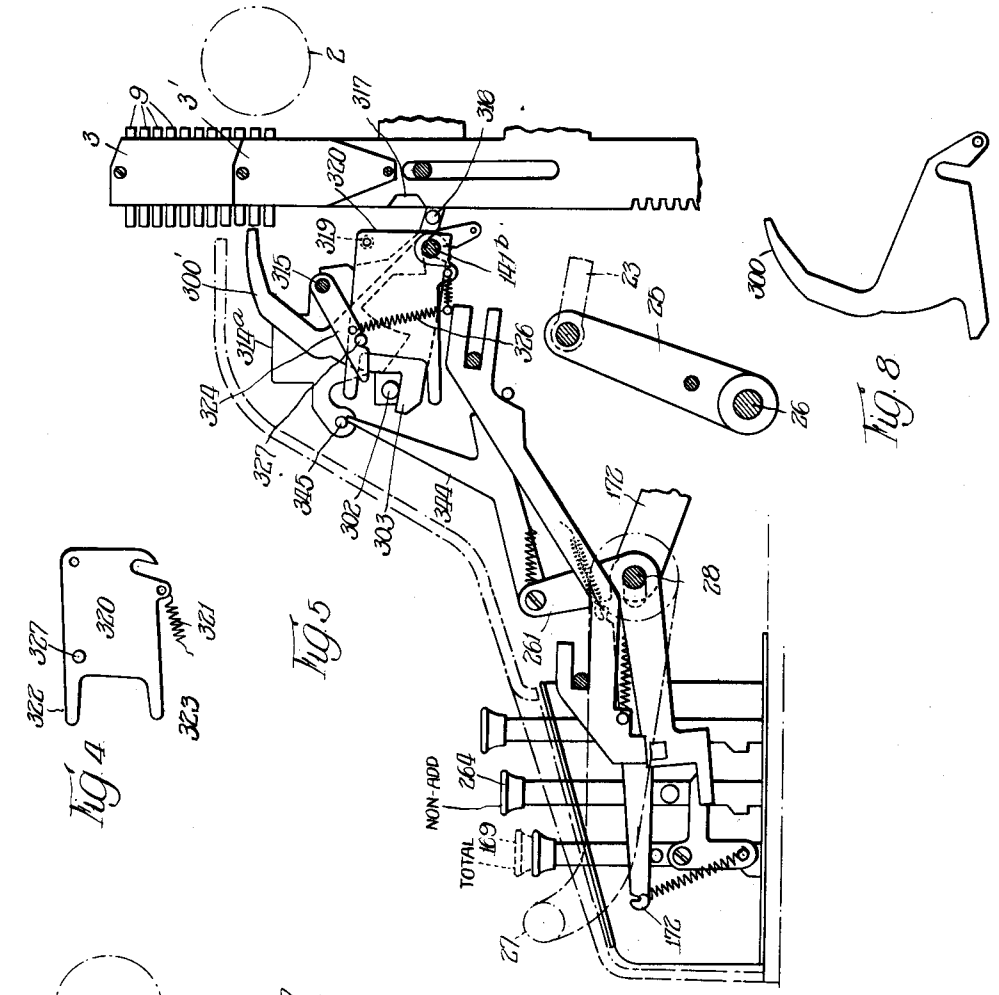


Fig. 3

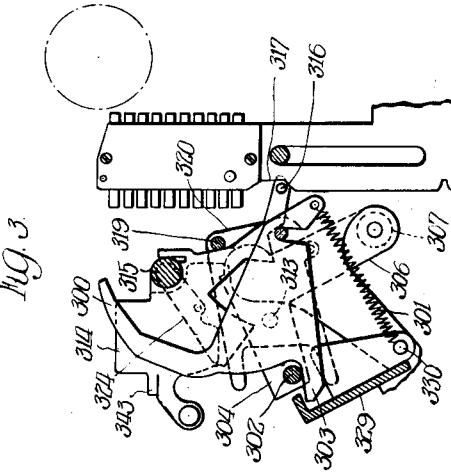


Fig. 4

Fig. 5

Fig. 6

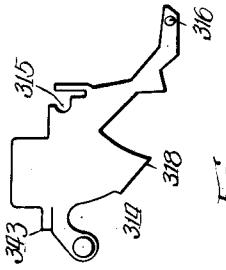


Fig. 7



Fig. 8

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PRINTING MECHANISM

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Fig. 9

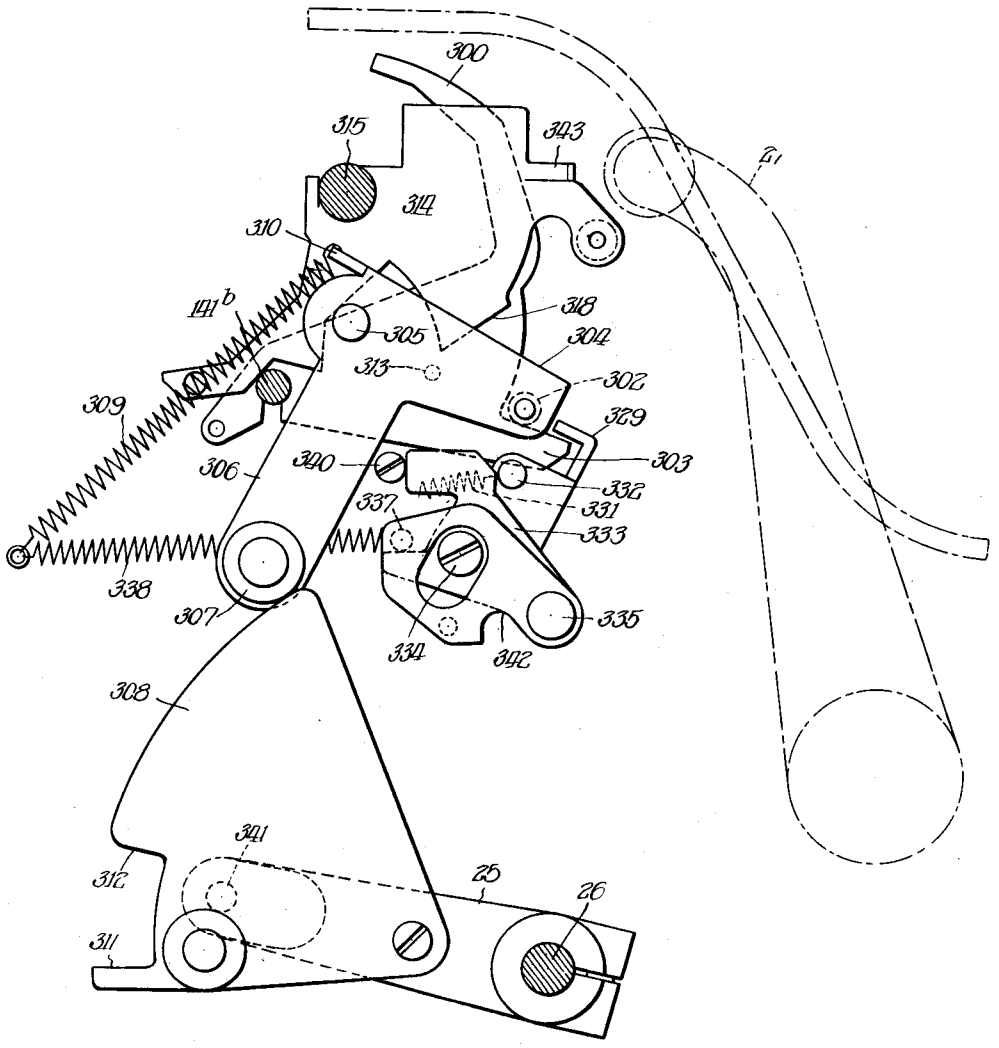


Fig. 10

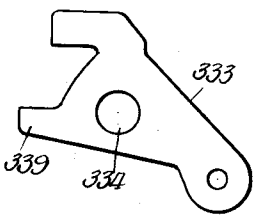
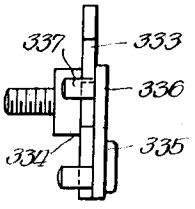


Fig. 11



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Patented Feb. 18, 1930 1,747,743

UNITED STATES PATENT OFFICE

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PRINTING MECHANISM

Original application filed October 25, 1923, Serial No. 670,665. Divided and this application filed June 4, 1928. Serial No. 282,599.

This application is a division of my application Serial No. 670,665, filed October 25, 1923. The invention herein claimed has for its primary object the provision of a hammer-controlling mechanism which shall not place any friction or pressure upon the type bars while the latter are being moved to printing position.

A further object is to provide improved means for controlling the hammer for the sign-printing type bar.

In the accompanying drawings,

Figure 1 is a fragmental sectional view illustrating a printing mechanism embodying the features of my invention.

Fig. 2 is a front elevation of the hammer mechanism.

Fig. 3 is a fragmental sectional view of the printing mechanism in its initial position or position of rest.

Fig. 4 is a detail view of one of two pivoted plates that carry a universal latch-restoring bar.

Fig. 5 is a fragmental sectional view showing the means for controlling the latch associated with the sign-printing hammer.

Fig. 6 is a detail view of one of the hammer-controlling latches.

Fig. 7 is a detail view of a certain detent.

Fig. 8 is a detail view of one of the hammers.

Fig. 9 is a view of the hammer mechanism looking from the left-hand side of the machine.

Figs. 10 and 11 are detail views of certain parts comprised in the hammer mechanism.

The sheet or tape on which the items and totals are to be printed and the calculations recorded may be supported in various ways. In the present instance, a cylindrical platen 2 is employed. The printing is effected by means of type bars 3 which in this instance are vertically reciprocatory, one such bar being provided for each numerical order. The type bars are arranged compactly side by side. Each type bar 3 is provided at its upper end with type 9.

The means for vertically moving each bar 3 into and out of printing position comprises an arm 10 carrying a headed stud that lies in an elongated opening 11 in the type bar. The arm 10 is loosely mounted on a shaft 12 which is supported in the framework of the machine. Rigid with the arm 10 is an arm 13 which is yieldingly connected through two helically coiled contractile springs 14 to a rod 15. The latter is carried by two side members 16 (one at each side of the machine) which are guided for approximately vertical movement. Pivoted to the upper ends of the side members 16 are two levers 19 which are mounted in the framework of the machine to swing on the axis 19^a. To the lower ends of the levers 19 are pivoted links 23, the forward ends of which are pivoted to two crank arms 24 and 25 (Figs. 1, 5 and 9) fixed to opposite ends of the main rock shaft 26. The shaft 26 is arranged to be rocked by means of a handle or crank 27 mounted to swing upon the axis 28, said handle being connected to the arm 24 by suitable means, as, for example, that disclosed in the Sundstrand Patent No. 1,611,390, dated December 21, 1926. It will, of course, be understood that an electric motor may be used to rock the shaft 26, if desired.

When the operator pulls the handle 27 forward, the crank arms 24 and 25 swing upwardly, thereby drawing the lower ends of the levers 19 forwardly and moving the side members 16 and the rod 15 downwardly. The movement of the rod 15 is yieldingly transmitted through the springs 14 and the arms 13 and 10 to such of the bars 3 as are at liberty to rise. When the operator releases the handle upon the completion of the forward stroke, those bars 3 which were raised in the forward stroke of the handle are moved down by means comprising a transverse rod 29 overlying the forward portions of the arms 10.

If desired, means may be provided for printing a distinguishing character in connection with certain impressions. Herein is shown a special sign-printing bar 3′ (Fig. 5) which is constructed and mounted substantially like the type bars 3. The imprint of the upper type carried by the bar 3′ serves as the Total sign when in red and as the Non-add sign when in blue. Means of any preferred character, as, for example, that fully

disclosed in my application Serial No. 670,665 may be employed to raise the type bar 3′ to the desired extent and to return it to normal position.

For each type bar 3 and 3′ there is a hammer 300, 300′, respectively. The shape of these hammers is best shown in Fig. 8. The hammers are pivoted on a rod 141ᵇ, and are impelled against the type by individual contractile springs 301. After each printing operation those hammers which took part therein are restored to normal position, or "cocked," by a universal rod 302 arranged to overlie lugs 303 on the hammers. The rod 302 is attached to a sheet-metal stamping which virtually constitutes an arm 304 pivoted at 305 in the machine frame. Said stamping comprises an arm 306 (Figs. 2, 3 and 9) carrying a roller 307 that runs on a cam 308 fixed to the arm 25. A contractile spring 309 attached to a lug 310 on the arm 304 assists to hold the roller in contact with the cam. As the cam 308 completes its upward swing the surface 311 positively forces the rod 302 to the upward limit of its movement. As the cam swings downwardly, the surface 312 positively forces the rod 302 down.

On the left-hand side of each hammer is a pin 313 (Figs. 2 and 9). At the left-hand side of each hammer is a latch 314 (Fig. 6) pivoted on the center 315. The latch for the sign-printing hammer is designated 314ᵃ. In the present embodiment of the invention, gravity is availed of to swing the latches downward, the forward ends of the latches being heavier than the rear ends thereof. The rear ends of the latches extend into the spaces between the type bars; and each latch carries on its right-hand side a pin 316 adapted to engage the forward edge of the adjacent type bar. The upper portion of said edge has a notch 317 therein which registers with the pin 316 when the type bar is down and which is above the pin when the type bar is raised to print the numeral 1 or a higher numeral.

Referring now to Fig. 6, it will be noted that each latch is provided with a projection 318. When the pin 316 on the latch stands in contact with the edge of a raised type bar, the projection 318 is out of the path of the pin 313 on the associated hammer, but when the pin 316 is in the notch 317 the projection 318 is in the path of said pin 313.

Although the weight of the forward ends of the latches 314 tends to place the pins 316 against the type bars, they are not allowed to engage the type bars until near the end of the forward stroke of the handle 27, at which time those type bars which are to take part in the printing operation have reached printing position. By thus avoiding friction on the type bars, the latter rise more promptly and are sure to reach printing position before the aliner (not herein shown) acts, thereby rendering possible very rapid operation of the machine without danger of inaccurate registration and printing. The means for restraining the latches until the type bars have reached printing position comprises a universal bar 319 lying behind the lower portions of the latches and carried by two plates or arms 320 (Fig. 4), one at each side of the set of hammers and latches. The arms 320 are pivoted on the rod 141ᵇ. Contractile springs 321 tend to raise the arms 320 and thus move the bar 319 rearwardly away from the latches. On the forward end of each arm 320 are lugs 322 and 323 arranged to be engaged by the bar 302. As the bar 302 rises, it engages the lugs 322 and positively moves the rod 319 away from the latches, leaving the latter free to swing into engagement with the type bars. In the downward movement of the bar 302 it engages the lugs 323, restores to normal position any latches that may have moved into engagement with the type bars, and places the rod 319 in position to restrain the latches from moving into engagement with the type bars.

In order that the rod 319 shall not move out of latch-restraining position until the type bars have moved to printing position, I provide two detents 324 (Figs. 3, 5 and 7), one at each side of the group of hammers and latches, which detents are pivoted at 315 and are held by contractile springs 326 against pins 327 on the arms 320. The detents 324 are notched at 328 to receive the pins 327. When the machine is at rest, the forward ends of the detents 324 bear against the pins 327 and hold the rod 319 in latch-restraining position. In the upward movement of the bar 302 said bar engages the lugs 322 and raises the arms 320 against the tension of the springs 326 until the pins 327 pass into the notches 328 in the detents 324, thus moving the rod 319 out of latch-restraining position and holding it there until the rod 302 in its downward movement strikes the lugs 323 and forces the pins 327 out of the notches 328, when the springs 326 complete the movement of the rod 319 into latch-restraining position.

A universal latch 329 (Figs. 2, 3 and 9) adapted to engage the lugs 303 on the hammers is pivoted at 330 and is normally held in position to restrain the hammers by means of a contractile spring 331. The latch 329 carries a stud 332 which is normally held by the spring 331 against the upper arm of a lever 333 (Fig. 10) pivoted at 334 in the machine frame. To the lower arm of the lever 333 is pivoted at 335 a catch 336 carrying a pin 337. A contractile spring 338 connected to the pin 337 normally holds said pin against a lug 339 (Fig. 10) on the lever 333 and thus holds the upper arm of said lever against a stop pin 340 on the machine frame. The arm 25 has

a stud 341 which in the upward swing of said arm engages the beveled lower side of the catch 336 and raises said catch against the tension of its spring 338, the catch turning on its pivot 335. As the stud 341 completes its upward movement it slips into a notch 342 in the catch 336. As the arm 25 begins to return, the stud 341 causes the catch 336 and the lever 333 to turn on the pivot 334, thereby forcing the universal latch 329 away from the lugs 303, the stud 341 soon thereafter leaving the notch 342

The notches 317 are of such length that the slight upward movement of the type bars into position to print ciphers does not carry said notches above the studs 316; consequently, when a cipher is to be printed other means must be employed to hold the projection 318 out of the path of the pin 313 on the hammer that is to cause printing of the cipher. The means herein shown for this purpose consists of a lug 343 on each latch 314 arranged to overlie the latch next to the left. When any latch 314 is held up by engagement of its stud 316 with an elevated type bar, all the latches to the right are likewise supported in position to permit operation of their hammers. The latch 314^a has no lug 343.

In summarizing the operation of the hammer mechanism, reference will be made to Fig. 3, which shows the machine at rest, the type bars being down, the hammers being held cocked by the restoring rod 302, and the latches 314 being held with their pins 316 away from the type bars A number having been set up, the handle 27 is pulled. As the restoring rod 302 rises, the hammers move slightly until the lugs 303 are stopped by the universal latch 329. When the surface 311 (Fig. 9) engages the roller 307, the rod 302 completes its upward movement, the engagement of said rod with the lugs 322 causing the latch-restraining rod 319 to move back away from the latches 314, whereupon said latches swing by gravity until the pins 316 stop against the type bars. In the case of those type bars which are at the left of the type bars needed in printing the number set up (and which consequently have not been raised), the pins 316 swing far enough to enter the notches 317 of said non-elevated type bars, thus placing the projections 318 in the path of the pins 313 on the hammers for those type bars. In the case of those type bars which have been raised, the pins 316 stop against the edges of said type bars below the notches 317, whereby the projections 318 are prevented from moving into the path of the pins 313 on the hammers for said type bars and any type bars 3 to the right thereof. At the beginning of the return movement of the handle 27, the pull of the stud 341 on the catch 336 causes the universal latch 329 to swing forward away from the lugs 303, whereupon those hammers which are not restrained by the projections 318 are driven by their springs 301 against the type representing the number set up. In the return movement of the handle the rod 302 restores the released hammers, the lower corners of the lugs 303 being beveled so as to slip past the universal latch 329, and said latch being moved by its spring 331 into effective engagement with the lugs 303 as soon as the lugs on the released hammers have been drawn down below the latch. As the rod 302 completes its downward movement it engages the lugs 323 and pulls the arms 320 down until the pins 327 leave the notches 328, whereupon the springs 326 complete the downward movement of the arms 320 and thus place the rod 319 in latch-restraining position.

The sign-printing bar 3′ (Fig. 5) is normally approximately in position to print the Total sign and the Non-add sign. There being no upward movement of said type bar to be availed of to restrain the latch 314^a when these signs are to be printed, I provide a stop finger 344 which is rigid with a bell crank lever 261. When the Total key 169 or the Non-add key 264 is depressed, the stop finger 344 swings with the bell crank lever 261 into position to support a pin 345 on the latch 314^a for the sign-printing hammer 300′, whereby said latch is prevented from interfering with the movement of said hammer when the latter is released by the universal latch 329.

In order to hold the totalizer lever 172 (Fig. 5) against effective movement after the handle 27 has started back to initial position, and also to prevent depression of the Non-add key 264 after the handle has commenced to return, I provide a lug 346 (Fig. 2) on the universal latch 329 which moves into place over a lug 347 on the stop finger 344 when said latch is disengaged from the hammers. After the hammers have been released the machine cannot be cleared, nor addition prevented.

Various changes may be made in the construction herein disclosed without departing from the spirit and scope of the invention defined in the appended claims.

I claim as my invention:

1. A printing mechanism comprising a type bar having a notch therein, a spring-actuated hammer, a pivoted latch arranged to enter said notch or engage the edge of said type bar below said notch, said latch tending to swing into engagement with said notch and being then in position to restrain the hammer, a part to move the latch out of engagement with said type bar, said hammer having a lug thereon, a member arranged to engage said lug to cock the hammer, a latch to hold the hammer cocked, said member being arranged to move said part into and out of latch-restraining position,

means for operating said member and the second mentioned latch, a Total key, a Non-add key, and a part movable on the depression of either of said keys to restrain the first mentioned latch from interfering with the movement of said hammer.

2. A printing mechanism comprising a type bar having a notch therein, a spring-actuated hammer, a pivoted latch arranged to enter said notch or engage the edge of said type bar below said notch, said latch tending to swing into engagement with said notch, and being then in position to restrain the hammer, a part to move the latch out of engagement with said type bar, said hammer having a lug thereon, a member arranged to engage said lug to cock the hammer, a latch to hold the hammer cocked, said member being arranged to move said part into and out of latch restraining position, means for operating said member and the second mentioned latch, a Total key, and a part movable on the depression of said key to restrain the first mentioned latch from interfering with the movement of said hammer.

3. A printing mechanism comprising a type bar having a notch therein, a spring-actuated hammer, a pivoted latch arranged to enter said notch or engage the edge of said type bar below said notch, said latch tending to swing into engagement with said notch and being then in position to restrain the hammer, a part to move the latch out of engagement with said type bar, said hammer having a lug thereon, a member arranged to engage said lug to cock the hammer, a latch to hold the hammer cocked, said member being arranged to move said part into and out of latch restraining position, and means for operating said member and the second mentioned latch, a Non-add key, and a part movable on the depression of said key to restrain the first mentioned latch from interfering with the movement of said hammer.

4. A printing mechanism comprising a type bar having a notch therein, a spring-actuated hammer, a pin on said hammer, a pivoted latch, a stud on said latch arranged to enter said notch or engage the edge of said type bar below said notch, said latch tending to swing to place said stud in said notch, said latch being in the path of movement of said pin when said stud is in said notch and thus serving to restrain the hammer, a part to move the latch out of engagement with said type bar, said hammer having a lug thereon, a member arranged to engage said lug to cock the hammer, a latch to hold the hammer cocked, said member being arranged to move said part into and out of latch-restraining position, and means for operating said member and the second mentioned latch.

5. A printing mechanism comprising a series of type bars each having a notch therein, a series of pivoted spring-actuated hammers one for each type bar, a pin on each hammer, pivoted latches alternating with the hammers, a stud on each latch arranged to enter the notch in the adjacent type bar or engage the edge of said type bar below the notch, said latch tending to swing to place said stud in said notch, said latch being in the path of movement of said pin when said stud is in said notch and thus serving to restrain the hammer, a universal bar to move the latches out of engagement with the type bars, means for operating the universal bar, and means for cocking the hammers and for releasing them to the restraint of the latches.

6. A printing mechanism comprising a series of type bars each having a notch therein, a pivoted spring-actuated hammer for each type bar, a latch pivoted alongside each hammer on an axis above the axis of the hammer, said latch being arranged to enter said notch or engage the edge of said type bar below said notch, said latch tending to swing downwardly into engagement with said notch and being then in position to restrain the hammer, a universal bar to move the latches out of engagement with the type bars, each hammer having a lug thereon, a universal rod arranged to engage said lugs to cock the hammers, a latch to hold the hammers cocked, said universal rod being arranged to move said universal bar into and out of latch-engaging position, and means for operating said universal rod and the last mentioned latch.

7. A printing mechanism comprising a type bar having a notch therein, a spring-actuated hammer, a pivoted latch arranged to enter said notch or engage the edge of said type bar below said notch, said latch tending to swing into engagement with said notch and being then in position to restrain the hammer, a part to move the latch out of engagement with said type bar, said hammer having a lug thereon, a member arranged to engage said lug to cock the hammer, a latch to hold the hammer cocked, said member being arranged to move said part into and out of latch-restraining position, and means for operating said member and the second mentioned latch.

In testimony whereof, I have hereunto affixed my signature.

OSCAR J. SUNDSTRAND.