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KEY MECHANISM FOR CALCULATORS.

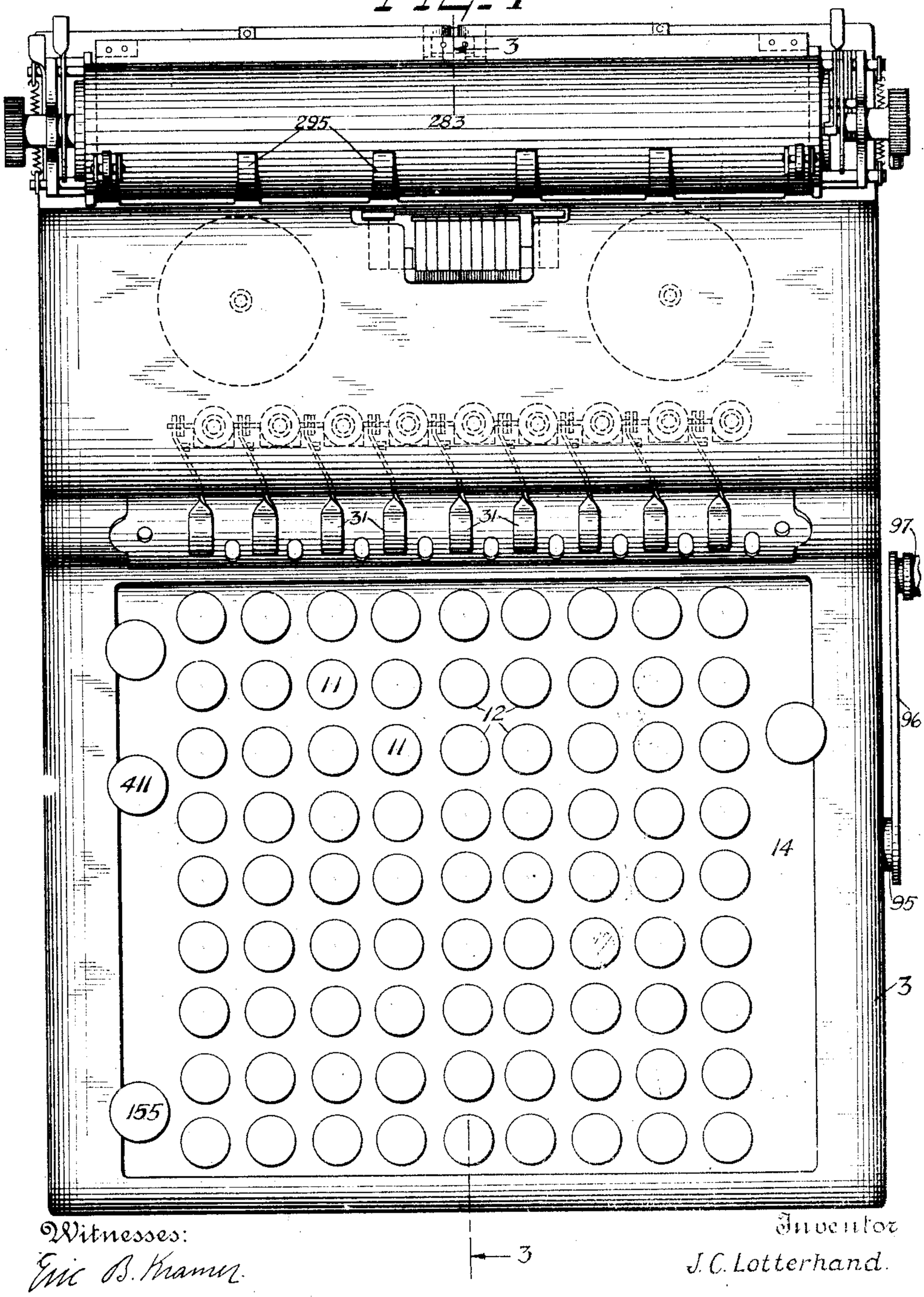
APPLICATION FILED FEB. 16, 1915.

1,167,001.

Patented Jan. 4, 1916.

3 SHEETS—SHEET 1.

Fig. 1



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3 SHEETS—SHEET 2.

FIG. 2

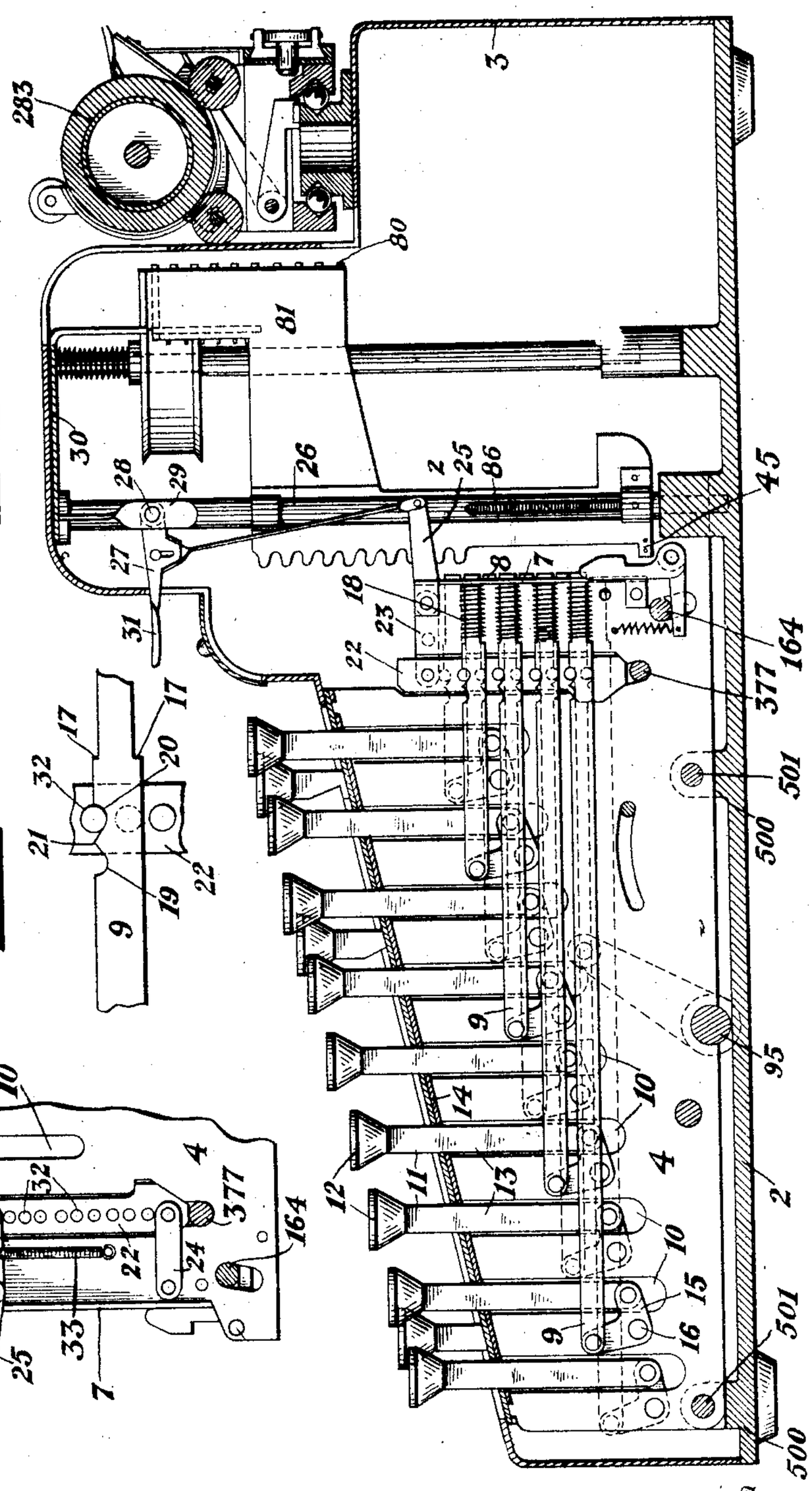

FIG. 4

FIG. 3

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3 SHEETS—SHEET 3.

Fig. 5

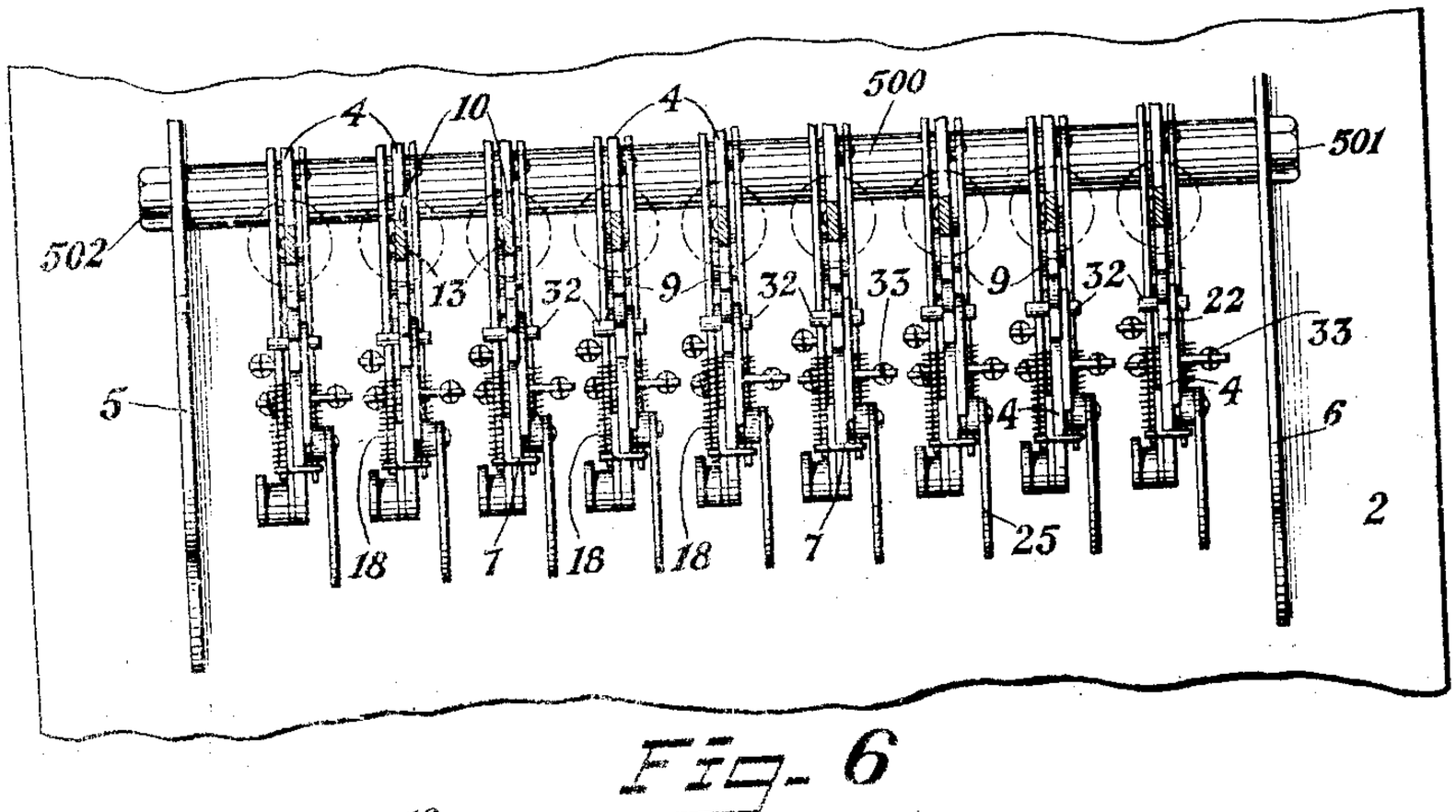


Fig. 6

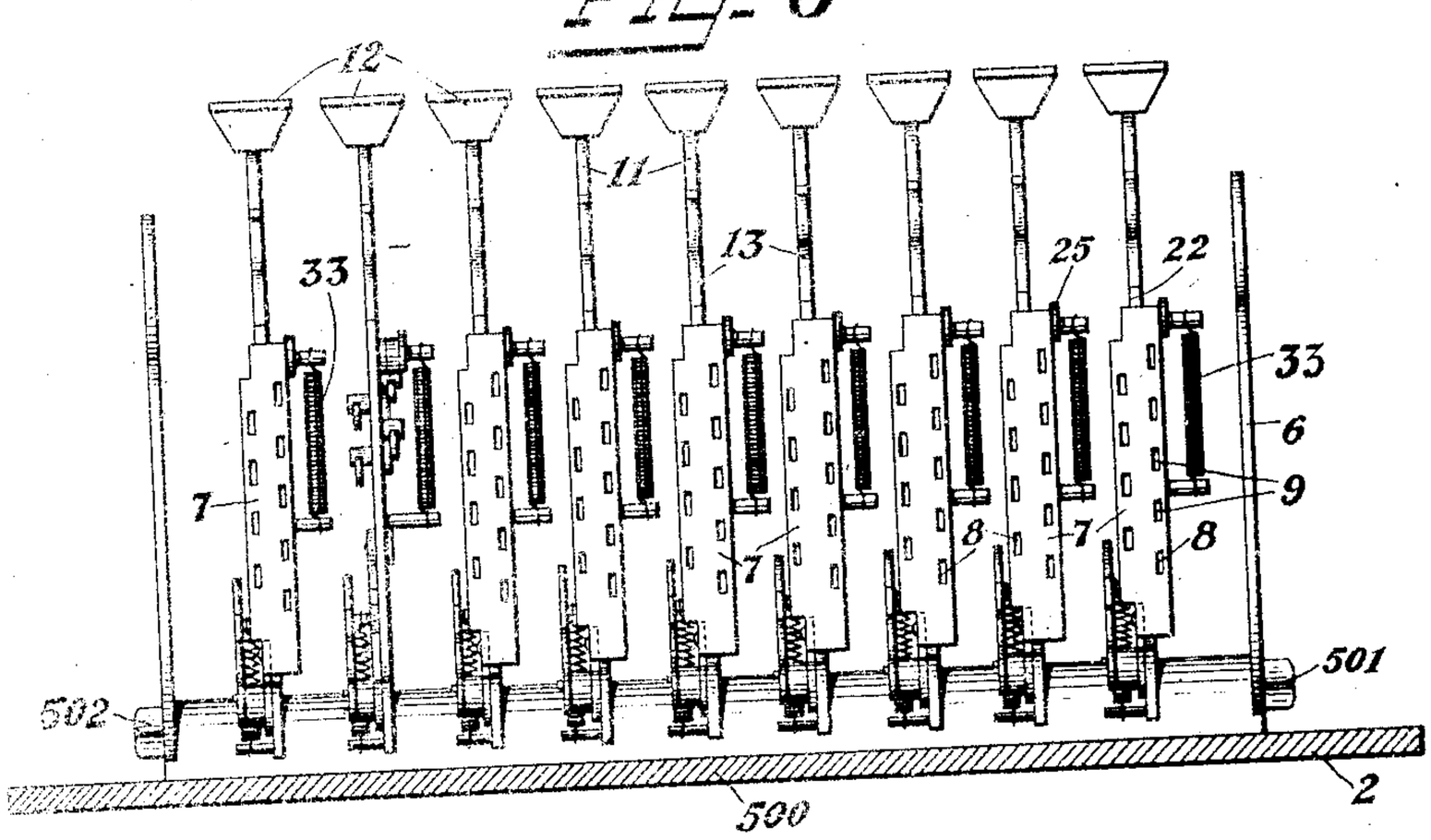


Fig. 7

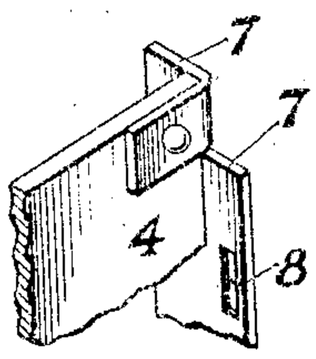
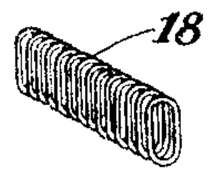


Fig. 8



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UNITED STATES PATENT OFFICE.

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KEY MECHANISM FOR CALCULATORS.

1,167,001. Specification of Letters Patent. Patented Jan. 4, 1916.

Original application filed February 24, 1908, Serial No. 417,352. Divided and this application filed February 16, 1915. Serial No. 8,474.

To all whom it may concern:

Be it known that I, JASON C. LOTTERHAND, a citizen of the United States, and a resident of New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Key Mechanism for Calculators, of which the following is a specification.

This invention relates particularly to the keyboard mechanism of calculating machines.

One of the objects of the invention is to provide in a keyboard of this character, a series of supports or plates, one for each bank or vertical column of keys, which support has operably carried thereby the keys for that column, together with the stop bars and connected parts; whereby any one of these plates can be removed from the keyboard and all of such members, that is, the keys and stop bars and connected parts will remain attached to the support; so that when the support is replaced in the machine these said members will be ready for operation without any adjustment or reassembling.

A further object of this invention is to provide means for limiting the advance or depression of the key stems, in the nature of abutments on the supporting plates, that receive the direct thrust of the key stem when depressed.

Another object of the invention is to provide means in connection with the described supporting plate for the key stems and stop bars, whereby the stop bars and connecting parts will be carried alternately on opposite sides of the supporting plates; and each plate is further provided with a guide member at its rear for guiding the stop bars.

This application is divided out of an application filed by me February 24, 1908, Serial No. 417,352.

In the accompanying drawings illustrating one embodiment of my invention, Figure 1 is a top plan view of one side of the machine, the other side being shown partly in section with the cover removed. Fig. 2 is a vertical section taken longitudinally through the machine. Fig. 3 is a detail showing the latch bars and connected parts. Fig. 4 shows enlarged a part of a stop bar and also of a latch bar. Fig. 5 is a top plan view of the rear ends of the key plates. Fig. 6 is a rear elevation of the parts shown in Fig. 5. Fig. 7 shows the attachment of the guide plate for the stop bar, to the supporting plate; and Fig. 8 shows the spring for the stop bars.

In the drawings the parts are shown mounted upon and within a framework comprising a base plate 2 and an outer upper casing 3 completely enveloping the machine and suitably apertured to permit the passage of some of the parts. It is provided with a series of vertically arranged upwardly projecting plates 4 adapted to serve as supports for the key system and with two other similar plates 5 and 6 to support other parts of the machine. Each of these plates 4, 5 and 6, are mounted in slots formed in transverse ribs 500 made integral with or secured to the base of the machine. Each rib is longitudinally apertured and when the plates are in position a retaining bolt 501 is passed through such aperture and also through apertures in the plates registering therewith, and a nut 502 engaging the end of the bolt holds the plate firmly in position. Each of these plates at its upper edge is provided with two projections 503 (Fig. 3) adapted to engage with suitable slots in the key plate 14 hereinafter set forth. Each plate at its rear end is provided with a transverse guide plate 7 (see Fig. 7) having rectangular apertures or slots 8 to permit of the passage of the stop bars 9 hereinafter set forth. Each plate is also provided with a series of recesses 10 to receive the key stems hereinafter mentioned.

Projecting upwardly through the casing 3 are the keys 11 arranged in denominational series in the usual manner, each provided with a finger piece 12 and with a depending stem 13 adapted to reciprocate in one of the recesses 10 of the plate 4 immediately beneath it, and which stem is guided by an aperture in the upper key plate 14, through which it passes and by its recess 10; the bottom of this recess serving to limit the downward movement of the key stem.

At its lower end each stem 13 is pivoted to an elbow lever 15, which lever is pivoted at 16 to the supporting plate 4. The other end of lever 15 is pivoted to one of the horizontal stop bars 9; the rear end of the stop

bar passing through one of the apertures 8 in the rear guide plate 7, whereby the stop bar is mounted to reciprocate horizontally. Each stop bar 9 is reduced at the rear forming shoulders 17, and a coil spring 18 surrounds the reduced end portion being compressed between the shoulders and the guide plate 7.

Each bar 9 is provided on its upper edge with two adjacent notches 19 and 20 (see Fig. 4), that form between them a summit 21. The elbow levers 15 and the stop bars 9 are located alternately on opposite sides of the plate 4 common to each series.

Each series of the keys is provided with a latch bar 22 (see Fig. 3), vertically suspended in a recess in the plate 4 on two parallel arms 23 and 24 that are pivoted to the plate 4. A rearward extension 25 of the arm 23 is pivoted to a release bar 26 connected to a release lever 27, pivoted at 28 to a suitable bracket or arm 29 projecting from a top plate 30 at the upper part of the casing. The lever 27 has a finger piece 31 with which it has a slotted connection. Each latch bar 22 is provided with projecting studs 32 adapted to engage with the notches 19 and 20 in the stop bars 9 (see Fig. 4), and a spring 33 pulls the latch bar downwardly.

When any of the keys is depressed, as the engagement of a stud 32 on the latch bar 9 with the summit 21 occurs, the rearward movement of the stop bar causes the summit to raise the pin and latch bar until the summit moves rearward beyond the middle portion of the pin 32, whereupon the further rearward movement of the bar 9 will bring the stud 32 to engage the rearward wall of the notch 19, and the stud and latch bar will be drawn downward by the spring 33 until the stud 32 rests in the bottom of the notch 19. The key now being released, the spring 18 would have the tendency to move the stop bar 9 forward to restore the depressed key, but the spring 33 holds the latch bar down with the stud in the notch 19, and the angular side of the notch is sufficient to prevent this retraction of the stop bar. This will cause the stop bar to have its end portion project rearward beyond the plate 7 at the aperture 8. It is usual in this class of machines to have a rack and type plate, such as the member 80 shown in Fig. 2, that is provided with a foot or projection 45, that when the plate is drawn upwardly by suitable means such as a coil spring 86 in the post 26, the foot will strike the rearwardly projecting stop bar 9, and the plate will be thereby arrested, with one of the type 81 positioned opposite the platen roller 283 for printing by means of a suitable hammer, not shown; such type corresponding with the key that has just been depressed to position the stop bar 9. But if the key depressed should not be the one desired in the same column, the act of pressing any other key in that same vertical column, that is, a key attached to the same supporting plate 4, will have the effect of releasing the advanced stop bar 9. It will be seen that when the other stop bar 9 is advanced, the pin 32 on the bar 22 will cause the bar to be elevated, and hence the stud 32 that has held the bar 9 in rearward position, will be moved upward out of the notch 19 in the bar 9, thereby releasing the stop bar 9, that will be at once moved forward by its spring 18 and restore the connected key stem. Therefore it will be understood that when any of the 9 key stems is depressed and the stop bar moved rearward to be engaged by the foot on the rack plate 80, the subsequent depression of any one of the other 8 key stems in that column, connected with the same supporting plate 4, will cause the release of the key stem previously depressed.

It is customary in machines of this character to provide a member operated at each swinging of the main handle or operating shaft that will so shift all of the latch bars, that each of the stop bars that may have been shifted to rearward position will be released and restored. In Fig. 2 is shown a bar 377, that by suitable means not herein set forth, is raised at each operation of the main shaft 95 for a short distance. This will elevate all of the latch bars 22, and the studs 32 will move out of the notch 19 of each stop bar that may have been moved rearward by depression of a key, and therefore all of the stop bars will be restored. It is also usual in machines of this character to provide a special key known as an error key. Such key when depressed will also elevate the bar 377 and likewise restore all of the depressed stop bars and keys.

It will be seen that by reason of the structure that has been set forth, whenever any key stem 13 is depressed by the operator, it will move downwardly until the lower end of the key stem seats itself in the bottom wall of the depression or recess 10 that forms an abutment in the supporting plate 4. Hence the key stem cannot be further depressed, and this abutment will receive the thrust on the key stem. Being an integral part of a vertical plate, such an abutment is not an additional member or part, but merely a surface formed on the supporting plate 4. Of course, this will limit the swing given to the elbow lever 15 and will limit the rearward advance of the particular connected stop bar 9. Thus the pressure on the top of the key stem 4 by the finger of the operator is directly received by the lower end of the stem striking the bottom of the recess 10 in the supporting plate 4. It will be also understood that by

the arrangement of the adjacent notches 19 and 20 having inclined or relatively angular adjacent side walls, the angular summit 21 is formed. When the stop bar is moved rearward on depressing a key, the stud 32 on the latch bar will ride up the inclined side of the notch 20 to elevate the latch bar, until the stud passes over the ridge of this summit; whereupon the further rearward movement of the stop bar will permit the stud to pass down the adjacent inclined edge of the recess 19, and this will continue until the stud 32 rests in the bottom of the notch 19. The shape of these walls prevents the return of the stop bar by its spring 18, by reason of the considerable tension of the spring 33 that holds the latch bar in the lowered position. But from the elevation of the latch bar by any cause, the stud 32 will move up from the notch 19, thereby releasing the advanced latch bar 9, that will be at once retracted by its spring 18 to restore the depressed key. As has been set forth, the rearward movement of any stop bar 9 at the time when any other stop bar is held in the rearward position with the stud 32 in the depression 19, will elevate the latch bar and thereby release the advanced stop bar, to permit the latter to return to normal position. It will be further understood that each of the plates 4 has pivoted thereon, and hence carried thereby, the nine elbow levers 15; to which levers are permanently pivoted the nine key stems 13 (guided in slots 10), and also the nine stop bars 9; which stop bars 9 at their other end portions are guided and supported by the slotted plate 7 that is permanently secured at the rear of each supporting plate 4. Consequently, upon removal of the supporting bolts 501, any one of the supporting plates 4 can be removed, upon previous removal of the casing 3 and the guide plate 14; but the key stems together with the stop bars and connecting elbow levers will still be attached to the supporting plate 4, and this plate 4 can be returned to its former position on the ribs 500, when these members, the stems, elbow levers and stop bars, will be by such act completely reassembled and ready for use, upon the return of the slotted plate 14 that guides the key stems.

Having thus described my invention, what I claim is:

1. In combination, a key provided with a depending stem, a plate provided with a recess in which the stem is adapted to move and which serves to limit its movement, a bar adapted to move alongside of the plate, and a crank pivoted to the plate, the key stem and the bar.

2. In a machine of the character described, a key stem, a bar adapted to be moved thereby and having two adjacent notches on its upper edge, a support for the bar, and a latch provided with a stud adapted to engage in either notch of the bar.

3. In a machine of the character described, a key, a depending stem, a substantially horizontal bar, a jointed connection between the bar and the stem, a support and a guide for the bar, and means for retracting the bar to its original position, comprising a spring acting against the guide and support.

4. In a machine of the character described, a key supporting plate, a transverse guide plate having staggered apertures, a series of stop bars alternately arranged on opposite sides of the plate and the ends of which are adapted to engage in said staggered apertures, means for reciprocating the bars comprising keys, one for each bar, and means for retracting the bars to position after such reciprocation, comprising a spring on each bar interposed between the transverse guide and a part of the bar.

5. In a machine of the character described, a key supporting plate, a transverse guide plate having staggered apertures, a series of stop bars alternately arranged on opposite sides of the plate and the ends of which are adapted to engage in said staggered apertures, means for reciprocating the bars comprising keys, one for each bar, and means for limiting the movement of the keys, consisting of stems on the keys and recesses in the plate on the bottoms of which the stems are adapted to impinge at the end of their stroke.

6. In a machine of the character described, a key supporting plate, a transverse guide plate having staggered apertures, a series of stop bars alternately arranged on opposite sides of the plate and the ends of which are adapted to engage in said staggered apertures, means for reciprocating the bars comprising keys, one for each bar, and means for permanently limiting the movement of the bars, consisting of means in the plate adapted to stop the keys at a predetermined point.

7. In a machine of the character described, a key supporting plate, a transverse guide plate having staggered apertures, a series of stop bars alternately arranged on opposite sides of the plate and the ends of which are adapted to engage in said staggered apertures, means for reciprocating the bars comprising keys, one for each bar, a latch bar adjacent to the stop bars and means for yieldingly maintaining the positions of the keys comprising adjacent notches on each bar and studs on the latch bar adapted to enter the notches.

8. In a machine of the character described, a key supporting plate, a transverse guide plate having staggered apertures, a series of stop bars alternately arranged on opposite sides of the plate and the ends of

which are adapted to engage in said staggered apertures, means for reciprocating the bars comprising keys, one for each bar, a latch bar adjacent the stop bars, and means for yieldingly maintaining the positions of the keys, comprising adjacent notches on each bar and studs on opposite sides of the latch bar adapted to engage the notches on the adjacent bars.

9. In a machine of the character described, a series of numeral keys, a series of substantially horizontal stop bars, one for each key, a vertical latch bar provided with separate means for engaging the separate bars of the series of stop bars, and means for yieldingly maintaining said engagement.

10. In a machine of the character described, a key supporting plate, a transverse guide plate having staggered apertures, a series of stop bars alternately arranged on opposite sides of the plates and the ends of which are adapted to engage in said staggered apertures, means for reciprocating the bars comprising keys, one for each bar and means for limiting the movement of the keys.

11. In a machine of the character described, a series of numeral keys, a series of stop bars, one for each key, adapted to be moved by the depression of the keys, and means whereby when one key of the series is depressed and its corresponding stop bar is moved, any other bar of the series which has been previously moved is automatically returned to its original position, which means comprise two adjacent notches on each stop bar and a summit between them, a latch bar having studs adapted to engage the notches on the stop bars, one at a time, and means adapted to retract the stop bars when the studs of the latch bar are disengaged from their notches.

12. In a machine of the character described, a series of numeral keys, a series of stop bars, one for each key, adapted to be moved by the depression of the keys, means whereby when one key of the series is depressed and its corresponding stop bar is moved, any other bar of the series which has been previously moved is automatically returned to its original position, which means comprise two adjacent notches on each stop bar and a summit between them, a latch bar having studs adapted to engage the notches on the stop bars one at a time, and means adapted to retract the stop bars when the studs of the latch bar are disengaged from their notches, consisting of a spring on each stop bar.

13. In a machine of the character described, a base plate, a top plate, and intermediate removable plates, each adapted to support a series of numeral keys.

14. In a machine of the character described, a base plate, a top plate, and intermediate removable plates, each adapted to support a series of numeral keys, and each provided with recesses adapted to receive the stems of said keys.

15. In a machine of the character described, a base plate, a top plate, and intermediate independent vertically removable plates, each adapted to support a series of numeral keys, a corresponding series of stop bars coöperating therewith, and a latch bar adapted to engage with the series of stop bars.

16. In a machine of the character described, a base plate, a top plate, and intermediate removable plates, each adapted to support a series of numeral keys, a series of cranks pivoted thereon, a series of stop bars hinged to the cranks and the keys, and a latch bar adapted to engage with the series of stop bars.

17. In a machine of the character described, a base plate, a top plate, and intermediate removable plates, each adapted to support a series of numeral keys, a series of cranks pivoted thereon, a series of stop bars hinged to the cranks and the keys, and a latch bar adapted to engage with the series of stop bars, and which latch bar is supported from pivots on the plate.

18. In a machine of the character described, a base plate having transverse ribs provided with slots, an upper plate provided with apertures, and a series of intermediate key supporting plates, each engaging in the slots of the ribs and provided with projections adapted to engage with the apertures in the upper plate, whereby they are secured in position and may be each removed from the machine without disturbing the location or arrangement of the parts supported thereon.

19. In a machine as set forth, a plate provided with a series of openings projecting inward from one edge of the plate, a set of keys having their stems projecting into said openings respectively, a set of stop bars one for each key, the said bars being connected with the keys to be advanced on depression of the key, and each key stem upon such depression engaging the bottom of the opening to limit the advance of the key stem.

20. In a machine as set forth, a plate provided with a series of openings extending into the plate from one edge thereof, a set of keys having their stems located in said openings respectively, a set of levers pivotally mounted on said plate, a set of stop bars one pivoted to each of said levers, said key stems being pivoted to said levers respectively and arranged when advanced to shift the stop bars and to engage the bottom of the opening to limit the advance of the key stem.

21. In a machine as set forth, a plate provided with a series of openings extending

into the plate from one edge thereof, a set of keys having their stems located in said openings respectively, a set of levers pivotally mounted on said plate, a set of stop bars one pivoted to each of said levers, said key stems being pivoted to said levers respectively and arranged when advanced to shift the stop bars and to engage the bottom of the opening to limit the advance of the key stem, said levers and their connected stop bars being alternately located on opposite sides of said plate.

22. In a machine of the character described, a key-supporting plate, a transverse guide plate secured to one end of said plate and provided with staggered apertures on opposite sides of the plane of said key-supporting plate, a series of stop bars alternately arranged on opposite sides of said supporting plate and engaging said apertures, and key members carried by said plate for operating the stop bars.

23. In a machine of the character described, a set of key-supporting plates, a transverse guide plate secured to one end of each plate and provided with staggered apertures on opposite sides of the plane of said key supporting plate, a series of stop bars alternately arranged on opposite sides of each said supporting plate and engaging said apertures, key members carried by said plate for operating the stop bars, and means for assembling the key-supporting plates for separate removal without disturbing the said parts carried by the plates.

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