April 1, 1941. R. E. H. HANSON 2,236,640

CALCULATING MACHINE

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Fig. 1.

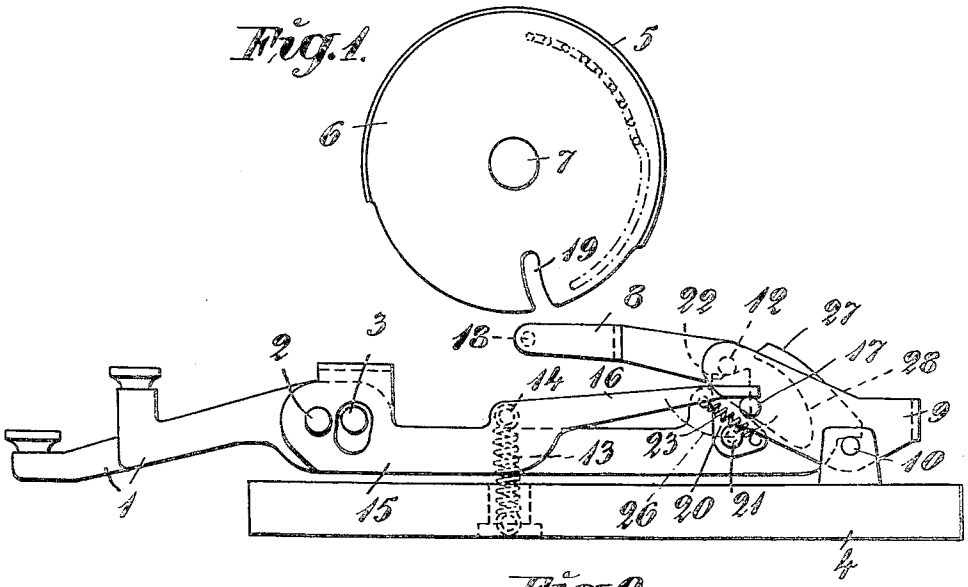
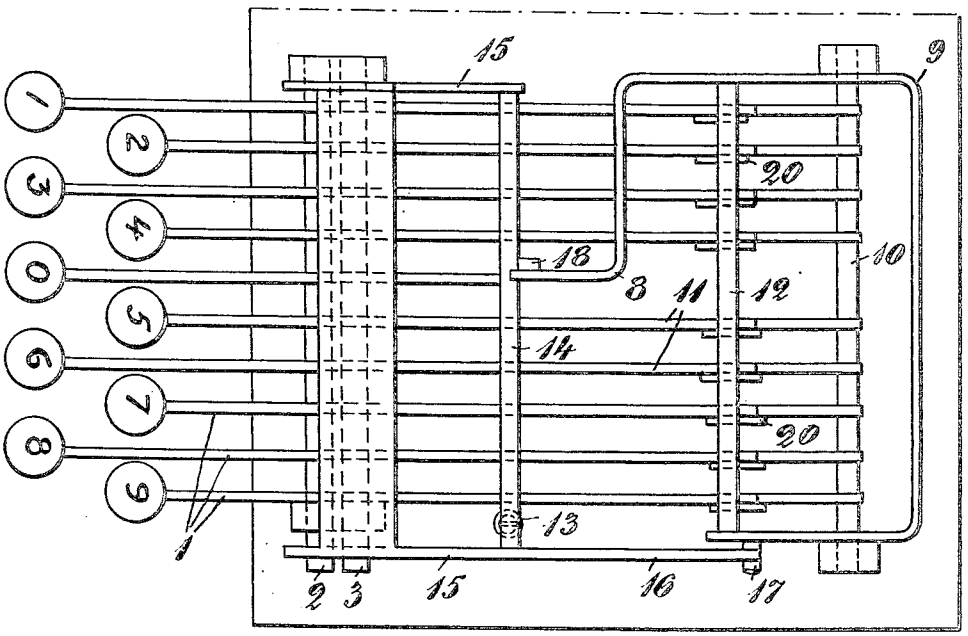


Fig. 2.



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Fig. 3.

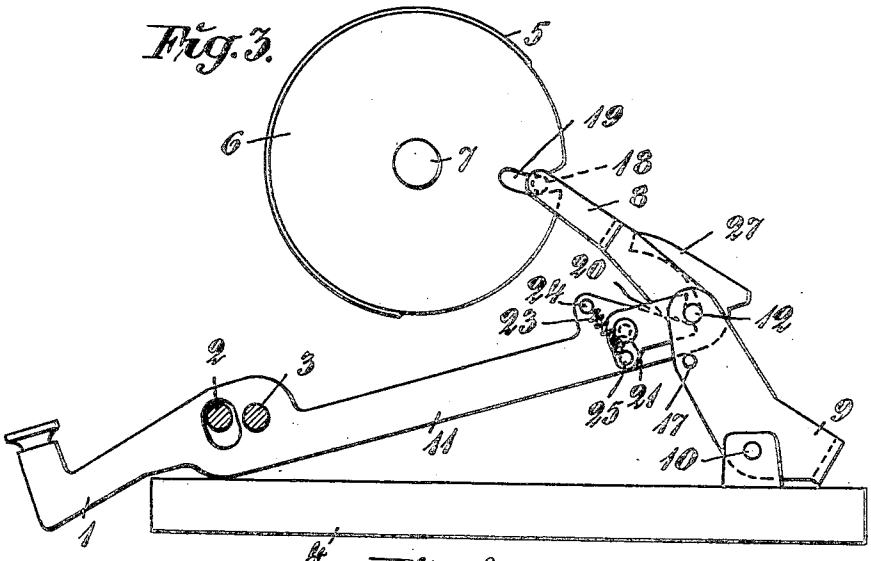
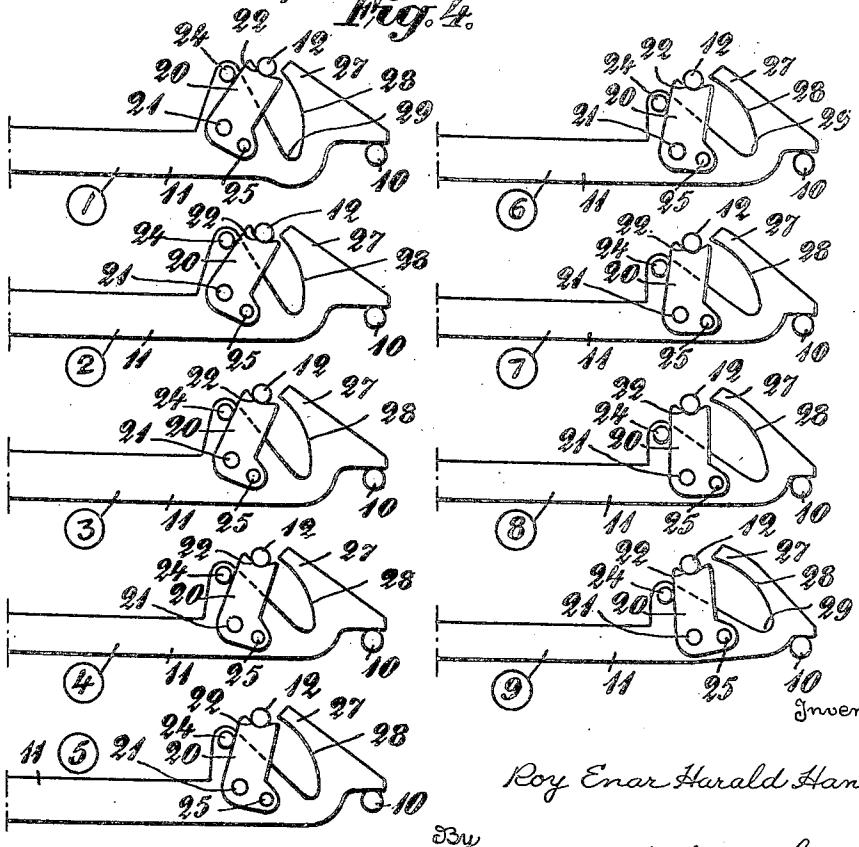


Fig. 4.



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Patented Apr. 1, 1941

2,236,640

UNITED STATES PATENT OFFICE

2,236,640

CALCULATING MACHINE

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Application April 20, 1939, Serial No. 268,996
In Sweden May 6, 1938

6 Claims. (Cl. 235—81)

The present invention relates to calculating machines in which digit wheels or digit indicating members or the like are adjusted by means of one or more key-operated and swingably mounted adjusting arms or the like. The invention is particularly but not exclusively intended to be used in connection with such calculating machines which are provided with a single set of ten teeth and in which the digit-wheels or digit indicating members or the like are mounted in a stepwise displaceable carriage and are adapted to be brought in succession into a setting position substantially in front of an adjusting arm carrying a lever bar or the like which extends across the key-levers and is adapted to be engaged by any one of the keys.

Calculating machines of this kind are already known in which the rearwardly extending key levers are provided at their free ends with arcuate slots of different length and inclination, adapted to cooperate with said lever bar or the like which is connected with the adjusting arm and which in its position of rest extends across the rear ends of the key levers right opposite to the mouths of the different slots, so that, upon depression of any one of the keys, the said lever bar is caught by the appertaining slot and brought along together with the adjusting arm a distance corresponding to the numerical value of the depressed key. On account of the friction between the lever bar and the edges of the slots, however, setting arrangements of said kind do not provide for as soft and easy a depression of the keys as is desirable.

The present invention has for its object to improve the mechanism for transmitting setting movement from the keys to the adjusting arm so that a softer depression of the key is obtained, particularly in such manner that the resistance to the depression of the key will become small particularly at the beginning and at the end of the stroke of the key. According to the invention the transmission of setting movement from each one of the numerical keys to the adjusting arm is effected through the intermediary of a push member which is pivoted preferably at or near the free end of the key lever and which is formed with an arcuate abutting edge or surface partly embracing the lever bar in such manner as to serve, on the depression of a key, as a pivot bearing surface for the lever bar while allowing the latter, in the position of rest of the key, to be moved freely by depression of another key. Cam friction between the lever bar and the key levers is thereby eliminated, since the bar will not get into contact with the key levers proper. The push member preferably forms together with the key lever a pair of toggle links, which are straightened out at the end of the key depressing movement, as shown in Figure 3.

The invention will now be described more in detail with reference to the accompanying drawings, which show an application of the invention in a calculating machine of the type in which the mechanism for setting up the items to be introduced into the totalizer comprises a rotor composed of a number of setting wheels each having a number of shiftable teeth. Figures 1 and 2 show in side view and in plan view respectively the part of the machine with which the invention is concerned. Figure 3 shows in a side view corresponding to Figure 1 one of the numerical keys in depressed position together with the parts cooperating with the key. Figure 4 shows how the push members of the various numerical keys, in their positions of rest, are angularly displaced mutually in correspondence with the appertaining numerical values.

The numerical keys 1 are pivoted in groups on two shafts 2, 3 carried by supports upstanding from a base plate 4. The group of keys pivoted on the shaft 2 comprises the keys having the numerical values 1, 3, 0, 6, 8, and the other group of keys, which is pivoted on the shaft 3, comprises the remaining numerical keys. The wheels to be rotated by means of the keys in this case consist of the adjusting disks or cam disks 6 of the setting wheels. Said cam disks are rotatable on the shaft 7 of the setting wheels and are provided with indicator flanges 5 carrying the figures 0–9. The adjusting or setting operation is effected by means of an adjusting arm 8 consisting of an S-shaped forwardly projecting extension from a yoke 9, which is pivoted on a shaft 10 and which carries between its legs a lever bar 12 extending across the rear ends of the key levers 11. Normally the rear ends of the key levers rest upon the shaft 10. The keys are spring-loaded by means of a spring 13 which is tensioned between the base plate 4 and a rod 14 extending across the key levers, said rod 14 forming part of a bridge 15 which is journalled on the shaft 2. The end of an arm 16 projecting rearwardly from the bridge 15 bears against the upper side of a pin 17 on the yoke 9, the latter being thereby held in depressed position by the spring 13.

The adjusting arm 8 carries at its outer end a pin 18 which during the setting operation engages into an arcuate inwardly extending slot 19 in the edge of the cam disk 6 being for the moment in setting position.

Each one of the keys carries at the rear end of the key lever a link or push member 20, which is pivotally mounted on a pin 21 and which is formed at its outer end with an arcuate concave operating edge 22 engaging the lever bar 12 in such manner as to allow the bar to be lifted freely by depression of another key while, upon depression of the appertaining key, said edge

serves as a bearing surface for the lever bar 12. In the position of rest the push member 20 is held against a stop abutment 24 on the key lever by means of a spring 23, which is tensioned between the stop abutment and a pin 25 on the push member.

As will be clear from Figure 4 the radius of the link or push member 20, i. e. the distance between the pivot point 21 of the link and the centre line of the lever bar 12, is equal for all the keys, but the links take up different inclined positions in their positions of rest, in that they are the more inclined the smaller is the numerical value of the corresponding key. In the position of rest the turning centres 21 of the links as viewed from the side, compare Figure 1, are distributed along a circular arc 26 having the middle point of the lever bar 12 as its centre.

At their rear ends the key levers are also provided with a tongue 27 extending upwardly and forwardly, the forward edge 28 of said tongue having the shape of a circular arc the centre of which coincides with the centre of the appertaining link system, said tongue serving upon the depression of a key to prevent overthrow of the lifter rod 12 and upon the return movement of the key to force back the lifter rod and the setting arm to their starting positions.

The setting mechanism described has been found to provide for an easy and soft depression of the keys and it can be so devised that during the depression of a key the resistance will be relatively small at the beginning of the key stroke but is increased upon continued depression and is decreased again at the end of the depressing movement, so that the key will positively reach its bottom position. This last mentioned result can be obtained for example by connecting the spring 23 with the push member 20 in such a manner that the spring, in an intermediate position during the depressing movement, will cease to counteract the movement and instead assists, during the latter part of the movement, in bringing the lever bar 12 against the bottom 29 of the recess in the key lever formed by the tongue 27, said bottom 29 serving as a stop abutment to limit the movement.

The setting mechanism according to the invention may be used for adjusting any kind of adjustable setting members in a calculating machine such as digit wheels, setting disks, digit indicating wheels or segments and so on.

I claim:

1. In a calculating machine the combination with a setting member to be adjusted, of a key-lever, a swingably mounted adjusting arm, a lever bar connected with said adjusting arm and extending across the rear end of said key-lever, and an intermediate push member pivotally mounted on the rear end of said key-lever so as to be swingable perpendicularly to said lever bar, said push member being formed with an arcuate bearing surface partly embracing said lever bar in such manner as to allow said bar, in the position of rest of the key, to be moved freely away from said bearing surface.

2. In a calculating machine the combination with a setting member to be adjusted, of a key-lever, a swingably mounted adjusting arm, a lever bar connected with said adjusting arm and extending across the rear end of said key-lever, an intermediary push member pivotally mounted on the rear end of said key-lever so as to be swingable perpendicularly to said lever bar, said push member being formed with an arcuate bearing surface partly embracing said lever bar in such manner as to allow said bar, in the position of rest of the key, to be moved freely away from said bearing surface, a stop abutment on said key lever, and a spring, tending to hold said intermediate push member in contact with said stop abutment.

3. In a calculating machine the combination with a setting member to be adjusted, of a key-lever, a swingably mounted adjusting arm, a lever bar connected with said adjusting arm and extending across the rear end of said key-lever, an intermediate push member pivotally mounted on the rear end of said key-lever so as to be swingable perpendicularly to said lever bar, said push member being formed with an arcuate bearing surface partly embracing said lever bar in such manner as to allow said bar, in the position of rest of the key, to be moved freely away from said bearing surface, and an extension at the rear end of said key lever, the front edge of said extension being formed as a circular arc the centre of which substantially coincides with the axis of rotation of the intermediate push member and the radius of which is so dimensioned that the said lever bar, upon depression of the key, moves along said edge, overthrow of the lever bar being thus prevented.

4. In a calculating machine the combination with a setting member to be adjusted, of a key-lever, a swingably mounted adjusting arm, a lever bar connected with said adjusting arm and extending across the rear end of said key-lever, and an intermediate push member pivotally mounted on the rear end of said key-lever so as to be swingable perpendicularly to said lever bar, said push member being formed at its end with an arcuate edge engaging a cylindrical portion of said lever bar in such manner as to allow said bar to be lifted freely, said edge having a radius of curvature substantially equal with the radius of said cylindrical portion and being adapted to serve, upon depression of the key, as a pivot bearing surface for the lever bar.

5. In a calculating machine the combination with a setting member to be adjusted, of a number of key-levers, a swingably mounted adjusting arm, a lever bar connected with said adjusting arm and extending across the rear ends of said key-levers perpendicularly thereto, and a number of intermediate push members pivotally mounted each on the rear end of an appertaining one of said key-levers so as to be swingable perpendicularly to said lever bar, each of said push members being formed with an arcuate bearing surface partly embracing said lever bar in such manner as to allow said bar, in the position of rest of the key, to be moved freely away from said bearing surface upon operation of another key lever, the distance between the pivot point of each push member and the centre line of said lever bar being equal for all of the push members and the projections of the pivot points of the various push members in a plane perpendicular to the lever bar being distributed along an arc having the normal rest position of the lever bar as a center.

6. An arrangement according to claim 1, characterized in that the pivot point of the lever bar, the pivot point of the push member and the center of the lever bar are so located relatively to each other as to be substantially in line with one another at the end of the key depression.

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