Sept. 17, 1963 E. MAIER 3,104,055

MINIATURE-TYPE CALCULATING MACHINES

Filed July 5, 1961

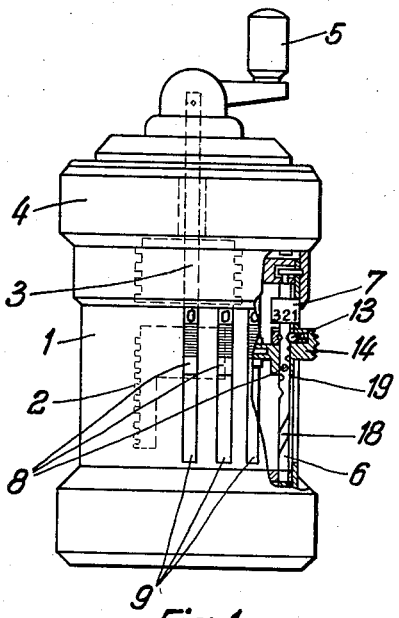

Fig. 1

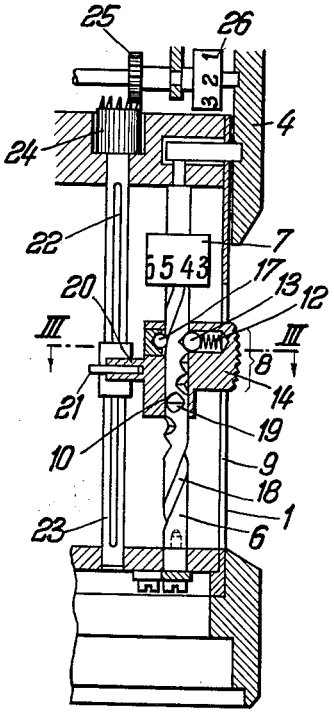

Fig. 2

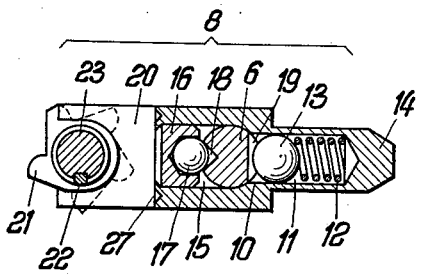

Fig. 3

Inventor:

Elinor Maier

United States Patent Office 3,104,055 Patented Sept. 17, 1963

3,104,055

MINIATURE-TYPE CALCULATING MACHINES

Elmar Maier, Feldkirch, Vorarlberg, Austria, assignor to Contina Bureaux und Rechenmaschinenfabrik, Aktiengesellschaft

Filed July 5, 1961, Ser. No. 122,031
Claims priority, application Austria July 11, 1960
9 Claims. (Cl. 235—73)

This invention relates to miniature-type calculating machines.

Such miniature-type calculating machines are known from U.S. Patent specifications 2,525,352; 2,533,372; 2,544,426; 2,566,835; 2,588,835; 2,661,155; and Re. 23,553.

The setting mechanism previously employed with these machines has the disadvantage that their design precludes the provision of a uniform resistance to the slide movement of all setting handles on the shaft. As a result, the setting handles are movable with different ease. This endangers the rapid and reliable setting of the above-mentioned calculating machines. Besides, the costs of manufacture, particularly the assembling costs, are relatively high. For instance, a known setting member comprises a guide member consisting of a guide screw, the tip of which engages the helical groove on the shaft and which must be adjusted to minimize the clearance between the tip of the screw and the surfaces defining the helical groove. The distance between the engaging points of the guide screw, on the one hand, and the locking member, on the other hand, considered in the axial direction of the shaft which carries the handle, gives rise to a turning moment on the setting member which displaces the guide screw so that it is difficult to move the setting handle.

According to the invention, these disadvantages are eliminated in that the points of engagement of the guide member and the locking member are disposed in the same transverse plane of the setting handle, which plane extends at right angles to the axial direction and suitably on the level of the grip provided for manipulating the handle. A simple design is obtained thereby that the locking and guide members are mounted diametrically opposite each other in a common bore, which extends radially to the axial bore of the setting handle, the guide member consisting of a ball, if desired. It is obvious that this guide ball may be mounted directly in the receiving bore and engage the walls thereof. It is desirable, however, to rotatably mount the guide ball in a spherical seat so that the rotatability of the ball reduces the resistance to the sliding movement of the setting handle on the shaft. To provide for a perfect mounting of the guide ball in the spherical seat, the diameter of the guide ball is suitably smaller than the inside diameter of the spherical seat.

To protect the bore against an ingress of dirt, dust or the like, the bore can be closed from the outside by a socket member comprising a spherical seat for said guide ball.

To enable a satisfactory, easy and time-saving assembly, it is also proposed that the socket portion of the opening, containing both the socket member and the guide ball, has an inside diameter which is larger than the inside diameter of that portion of the bore which receives the guide ball.

A very simple locking of the socket member in its operative position is effected by shaped portions of the bore wall of the setting member, which portions project into the cavity of the recess and behind the outwardly facing surface or parts thereof. To prevent the guide ball and/or locking ball from falling out through the

receiving bore provided for the shaft during the assembly or removal of parts of the setting device, e.g., when the shaft is withdrawn out of the setting handle, it is further proposed that the guide ball extends into the axial bore sufficiently to prevent the locking ball from falling out.

An illustrative embodiment of the invention is shown on the accompanying drawing, in which

FIG. 1 is an overall view of the circular calculating machine with the setting mechanism partly shown in section.

FIG. 2 is an enlarged view showing the setting mechanism of FIG. 1.

FIG. 3 is a transverse sectional view taken on line III—III of FIG. 2.

The miniature-type calculating machine comprises a cylindrical casing 1, in which the drive member 2, formed by several toothed segments, is centrally mounted by means of the shaft 3. The toothed segments of the drive member combine to form a stepped roller, which has arranged in a circle around it in the cylindric casing the setting mechanism. The cylindric casing 1 has mounted at its top the counter carriage 4, which is circular and centrically surrounds the shaft 3 passing through it. The shaft 3 has at its upper end the drive crank 5, by means of which the stepped roller, consituting the drive member 2, is turned. The setting mechanism comprises a number of shafts 6, which are arranged in a circle around the stepped roller 2 and parallel to the shaft 3, and which are rotatably mounted in the casing 1 at two points and carry a setting numeral drum 7 each. The drawing shows only one shaft 6 with one setting numeral drum 7. The setting handles 8 for the setting numeral drums 7 and the casing slots 9 for axially displacing the setting numeral drums 7 are visible in FIG. 1 of the drawing.

The shaft 6 is slidably arranged in the opening 10 of the setting handle 8. The opening 10 communicates with a transverse elongated bore, the portion 11 of which forms a recess which accommodates a spring 12 and a locking ball 13. The bore portion 11 is disposed in the grip 14 of the setting handle 8. At the end remote from the grip 14, the portion 11 of the transverse bore 10 is continued by a bore portion 15, which accommodates a socket member having a spherical seat 16, which turnably mounts a guide ball 17, that engages the helical groove 18 of the shaft 6 and drives shaft 6 so that the movement of the setting handle 4 along shaft 6 causes a rotation of the shaft 6 in accordance with the lead of the helical groove 18. The setting handle 8 is locked on the shaft 6 by the locking ball 13 engaging one of the wedge-shaped notches or recesses 19 provided for this purpose. The spacing between these recesses is selected to cause the setting handle to be arrested whenever the numerals on the numeral roller 7 are exactly in the desired indicating position. An extension 20 of the setting handle 8 straddles a gear wheel 21, which is non-rotatably but slidably held on a shaft 23 by means of a key 22. The shaft 23 acts by means of a crown wheel on the pinion 25 of the numeral roller 26 of a totalizer. In dependence on its set position on the shaft 23, the gear wheel 21 is engaged by corresponding projections of the stepped roller 2 operated by the crank 5 so that the rotation of the gear wheel 21 is resumed. The socket member with the spherical seat 16 is captively held in its effective position in the bore portion 15 by deformed portions of the outer rim around the bore obtained by punching depressions 27 into the rim.

Instead of conical recesses for accommodating the locking ball in accordance with the prior art, it is proposed to use recesses which are formed as notches having two surfaces extending at an angle to each other and inter-

secting along a line forming a chord of the circumference of shaft 6, as best seen in FIG. 3. This novel shape of the recesses results in a reduction of the manufacturing costs of the setting mechanism since the angularly turned set positions of shaft 6 are not determined by ball 13, but by ball 17.

What is claimed is:

1. In a miniature-type calculating machine, in combination, a plurality of setting shafts, each shaft having a helical groove and a plurality of axially and angularly spaced locking recesses; a setting member mounted on each shaft and being guided for movement along the same between a plurality of setting positions, said setting member including a guide member projecting into said groove and guided in the same for turning said shaft between a plurality of set positions during movement of said setting member between said setting positions, and a locking member engaging said locking recesses, respectively, in said setting positions, said locking member and said guide member being located in a common plane extending perpendicularly to said setting shaft so that manual pressure on said setting member for moving the same in opposite directions along said shaft will not cause movement of said guide member into and out of said helical groove.

2. In a miniature-type calculating machine, in combination, a plurality of setting shafts, each shaft having a helical groove and a plurality of axially and angularly spaced locking recesses; a setting member mounted on each shaft and being guided for movement along the same between a plurality of setting positions, said setting member including a guide member projecting into said groove and guided in the same for turning said shaft between a plurality of set positions during movement of said setting member between said setting positions, a handle portion, and a locking member engaging said locking recesses, respectively, in said setting positions, said locking member and said guide member being located in a common plane extending perpendicularly to said setting shaft through said handle portion so that manual pressure on said setting member for moving the same in opposite directions along said shaft will not cause movement of said guide member into and out of said helical groove.

3. In a miniature-type calculating machine, in combination, a plurality of setting shafts, each shaft having a helical groove and a plurality of axially and angularly spaced locking recesses; a setting member mounted on each shaft and being guided for movement along the same between a plurality of setting positions, said setting member having an elongated bore extending perpendicularly to said shaft and having two portions located on diametrically opposite sides of said shaft, said setting member including a guide member located in one of said portions projecting into said groove and guided in the same for turning said shaft between a plurality of set positions during movement of said setting member between said setting positions, and a locking member located in the other portion of said bore and engaging said locking recesses, respectively, in said setting positions, said locking member and said guide member being located in a common plane extending perpendicularly to said setting shaft so that manual pressure on said setting member for moving the same in opposite directions along said shaft will not cause movement of said guide member into and out of said helical groove.

4. A calculating machine as set forth in claim 1 wherein said guide member is a ball, and wherein said setting member is formed with a spherical seat turnably mounting said ball so that the same rolls in said helical groove during movement of said setting member.

5. A calculating machine as set forth in claim 1 wherein said locking member is a ball, and wherein said setting

member includes spring means for urging said ball into said locking recesses to arrest said setting member in said setting positions.

6. A calculating machine as set forth in claim 1 wherein said setting member has a bore extending perpendicularly to said shaft, a socket member mounted in said bore and having a spherical seat, said socket member being positioned in said bore by permanently deformed portions of said setting member; wherein said guide member is a ball turnably mounted in said spherical seat.

7. In a miniature-type calculating machine, in combination, a plurality of setting shafts, each shaft having a helical groove and a plurality of axially and angularly spaced locking recesses; a setting member mounted on each shaft and being guided for movement along the same between a plurality of setting positions, said setting member having an elongated cavity extending perpendicularly to said shaft and having two portions located on diametrically opposite sides of said shaft, said setting member including a guide ball located in one of said portions, said one portion being formed as a spherical seat mounting said guide ball for turning movement in a position projecting into said helical groove and guided in same for turning said shaft between a plurality of set positions during movement of said setting member between said setting positions, a locking ball located in the other portion of said cavity, and a spring located in said other portion and urging said locking ball to a position engaging said locking recesses, respectively, in said setting positions, said locking ball and said guide ball being located in a common plane extending perpendicularly to said setting shaft so that manual pressure on said setting member for moving the same in opposite directions along said shaft will not cause movement of said guide ball into and out of said helical groove.

8. A calculating machine as set forth in claim 7 wherein said locking ball has a greater diameter than said guide ball.

9. In a minature-type calculating machine, in combination, a plurality of setting shafts, each shaft having a helical groove and a plurality of axially and angularly spaced locking recesses, each of said locking recesses being a notch bounded by two surfaces extending at an angle to each other and intersecting along a line perpendicular to the axis of said shaft and forming a chord of the circumference of said shaft; a setting member mounted on each shaft and being guided for movement along the same between a plurality of setting positions, said setting member having an elongated cavity extending perpendicularly to said shaft and having two portions located on diametrically opposite sides of said shaft, said setting member including a guide ball located in one of said portions, said one portion being formed as a spherical seat mounting said guide ball for turning movement in a position projecting into said helical groove and guided in same for turning said shaft between a plurality of set positions during movement of said setting member between said setting positions, a locking ball located in the other portion of said cavity, and a spring located in said other portion and urging said locking ball to a position engaging said locking recesses, respectively, in said setting positions, said locking ball and said guide ball being located in a common plane extending perpendicularly to said setting shaft so that manual pressure on said setting member for moving the same in opposite directions along said shaft will not cause movement of said guide ball into and out of said helical groove.

References Cited in the file of this patent

UNITED STATES PATENTS

774,281	Seitzinger	Nov. 8, 1904
2,544,426	Herzstark	Mar. 6, 1951