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A. B. BLY. CALCULATING APPARATUS.

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NO MODEL.

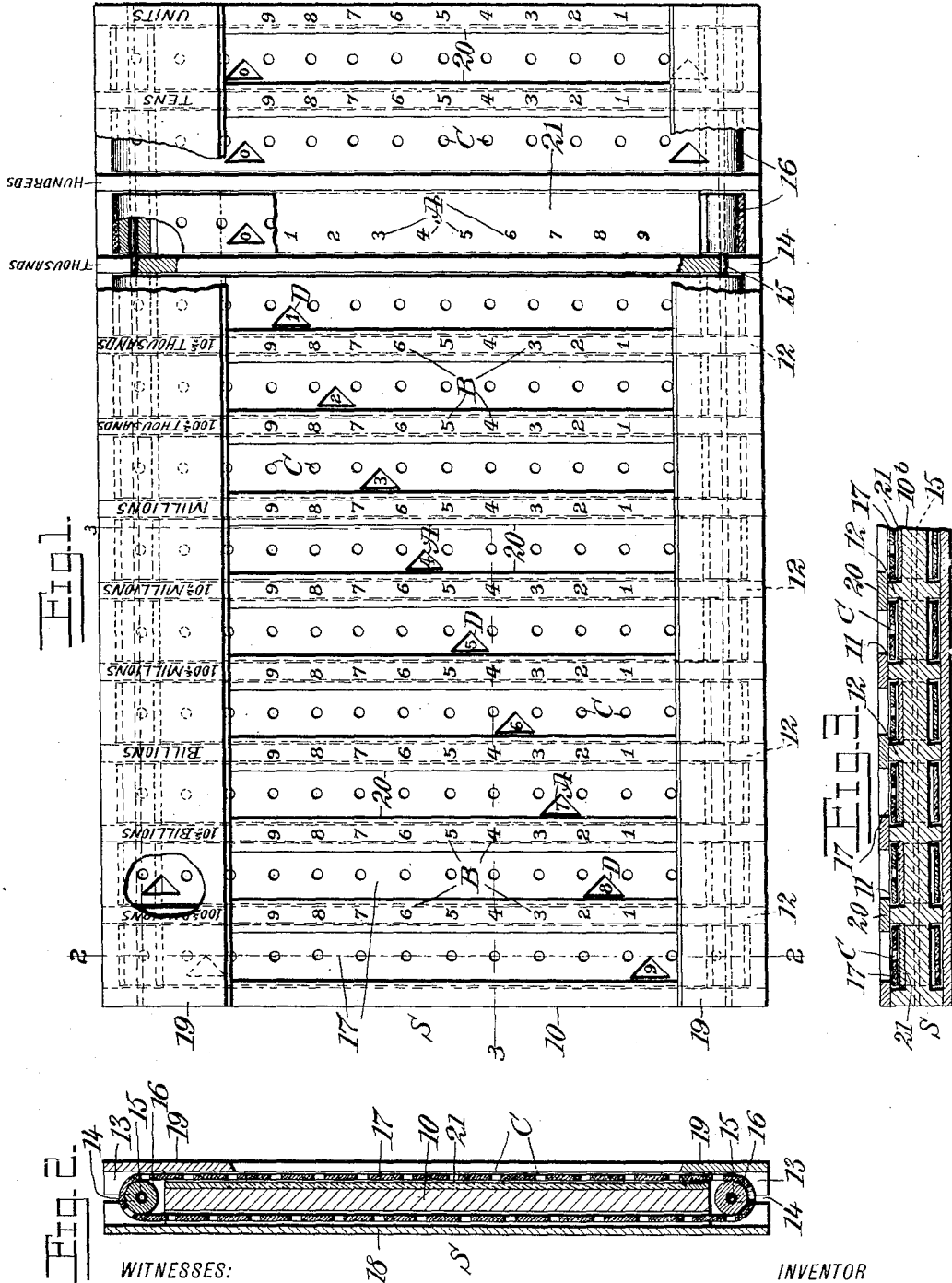


FIG. 2.

WITNESSES:

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BY

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ALBERT B. BLY, OF OTTUMWA, IOWA.

CALCULATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 770,552, dated September 20, 1904.

Application filed April 8, 1904. Serial No. 202,157. (No model.)

To all whom it may concern:

Be it known that I, ALBERT B. BLY, a citizen of the United States, and a resident of Ottumwa, in the county of Wapello and State of Iowa, have invented new and useful Improvements in Calculating Apparatus, of which the following is a full, clear, and exact description.

My invention relates to apparatus for performing various mathematical operations, being particularly adapted for the addition of series of numerals. Its principal objects are to provide a simple yet accurate calculating apparatus.

It consists in the various features and combinations hereinafter described, and more particularly claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a top plan view of one embodiment of my invention, parts being broken away and in section. Fig. 2 is a longitudinal section on the line 2 2 of Fig. 1, and Fig. 3 is a partial transverse section on the line 3 3 of Fig. 1.

S designates a support or base, which is here shown as consisting of a block 10, conveniently of wood, in which is formed a series of parallel longitudinal channels 11, here shown as twelve in number, said channels being situated between intermediate walls 12. At the end of each of the channels the block is cut away to furnish chambers 13, the side walls of which are slotted at 14, and through these slots extends a shaft 15, this lying transversely of the support at each end for its full width. In each of the support-chambers is located a roll 16, journaled upon the shaft, and over these rolls and through the corresponding channels operate endless calculating members or belts 17, which may be of any suitable flexible material or of flexibly-connected sections. The rear of the apparatus is preferably protected by a back board 18, while upon the front above the shaft and its rolls are cover-strips 19 19. To aid in holding the belts in place and protecting them from injury, retaining members are provided, here shown as cleats

20 extending along the tops of the walls 12 between the cover-strips 19 and furnishing flanges which at each side project over the channels.

Each of the calculating members represents a decimal group ranging from units at the right to hundred millions at the left, the values being inscribed upon the upper cover-strips, and adjacent to each of said members or belts are two series of numerals. One of these, which may be termed the "result" series, is arranged at A along the bottom of the channel, preferably at one side thereof, and consists of the first decimal series from "0" to "9," beginning adjacent to the upper strip 19 and extending to the opposite strip, while the second or "setting" series B occupy positions upon the cleats 20 at the right of their belts and comprise numerals from "1" to "9," reading from the bottom of the support upward or in the opposite direction from the companion result series. The numerals of these two series are separated by equal spaces and are so arranged that the figures of each are located midway of the spaces of the companion series.

Each belt bears two sets of divisions, which are shown in the form of openings. The setting-divisions C are shown as small circular perforations, nine in number, these being at the same distance from one another as are the numerals, there being three of these series here illustrated, although their number may vary with the dimensions of the apparatus. The result-divisions D are located at one end of the setting-divisions, between them and the next series, and are preferably in the form of triangles, each with an apex projecting between the perforations, the center of the opening being capable of registering with any numeral in the result series as the belt is moved over them. This triangular form provides a large result-opening which will not interfere with the setting-divisions or substantially weaken the belt. The setting-divisions not only serve as a scale, but also as means for engaging the belt with some pointed instrument to move it into the desired position. To prevent such instrument from scoring the bottom of the

channel or defacing the numerals carried thereby, there is preferably interposed between each belt and the base beneath it a sheet of transparent material 21, preferably of glass or celluloid, which extends between the side walls and from one cover-strip to the other.

In preparation for use each belt is set so that one of the divisions or openings D registers with the zero of the series of numerals A. Now suppose it is desired to add together the numbers "55" and "55." The operator places the point of a pencil or the like in the division C opposite the figure "5" of the unit or right-hand series. By this means he draws the belt down until this movement is stopped by the contact of the pencil with the bottom strip 19, which also serves as a contact member. This will cause the figure "5" to appear through the opening D. The pencil is now passed to the next or tens belt and the same operation performed. This also brings a "5" into view through the opening D of this belt. This shows that "55" has been registered. To add "55" to this, the point is transferred to the units-belt in the division C opposite the numeral "5," and it is again drawn into contact with the strip 19. In doing this it will be noticed that the pencil has been inserted in a setting-division above one of the result-divisions which is in sight above the strip 19. This indicates that there is one to carry to the tens-belt, and this is effected by putting the pencil-point in the setting-division opposite the numeral "1" and drawing it down to the strip. The five tens are now added as before upon the tens-belt, and in doing this the pencil again coacts with a setting-division above a visible result-division. Therefore in the same manner one should be transferred to the next or hundreds series, when the result of the addition, "110," may be read through the three result-openings. In the same manner any combination of numerals the sum of which does not exceed the capacity of the apparatus or is less than thousand millions may be added together.

In using the apparatus for subtraction the same general method is employed, except that for the number to be deducted the belts are moved in the opposite direction. Multiplications may be treated as multiple additions and divisions as multiple subtractions.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A calculating apparatus comprising a support provided with separate channels and having series of setting-numerals and series of result-numerals situated adjacent to the channels, and independent calculating members movable through the channels.

2. A calculating apparatus comprising a support provided with separate channels and

having series of numerals situated between the channels and a second series situated at the bottom of each channel, and independent calculating members movable through the channels.

3. A calculating apparatus comprising a support provided with channels and having series of numerals situated between the channels and a second series situated at the bottom of each channel, calculating members movable through the channels, and sheets of transparent material interposed between the calculating members and the bottoms of the channels.

4. A calculating apparatus comprising a support provided with channels having intermediate walls and series of numerals situated upon the walls and in the channels, rolls rotatably mounted at the ends of the channels, and belts moving through the channels over the rolls.

5. A calculating apparatus comprising a support provided with channels having intermediate walls and series of numerals situated upon the walls and upon the support within the channels, and belts movable through the channels.

6. A calculating apparatus comprising a support provided with channels having intermediate walls upon which are series of setting-numerals, the bottoms of the channels having series of result-numerals, and belts movable through the channels.

7. A calculating apparatus comprising a support provided with channels having intermediate walls upon which are series of setting-numerals, the bottoms of the channels having series of result-numerals, and belts movable through the channels and being provided with setting-divisions and a result-division.

8. A calculating apparatus comprising a support provided with channels having intermediate walls upon which are series of setting-numerals, the bottoms of the channels having series of result-numerals, and belts movable through the channels and having setting-openings and a result-opening.

9. A calculating apparatus comprising a support provided with channels and having series of numerals situated between the channels and a second series situated at one side of the bottom of each channel, and calculating members movable through the channels and having central series of openings and openings at one side thereof.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ALBERT B. BLY.

Witnesses:

CHESTER W. WHITMORE,
J. F. WEBBER.