July 21, 1936. A. KÅLL 2,048,453

CALCULATING MACHINE

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Fig. 1.

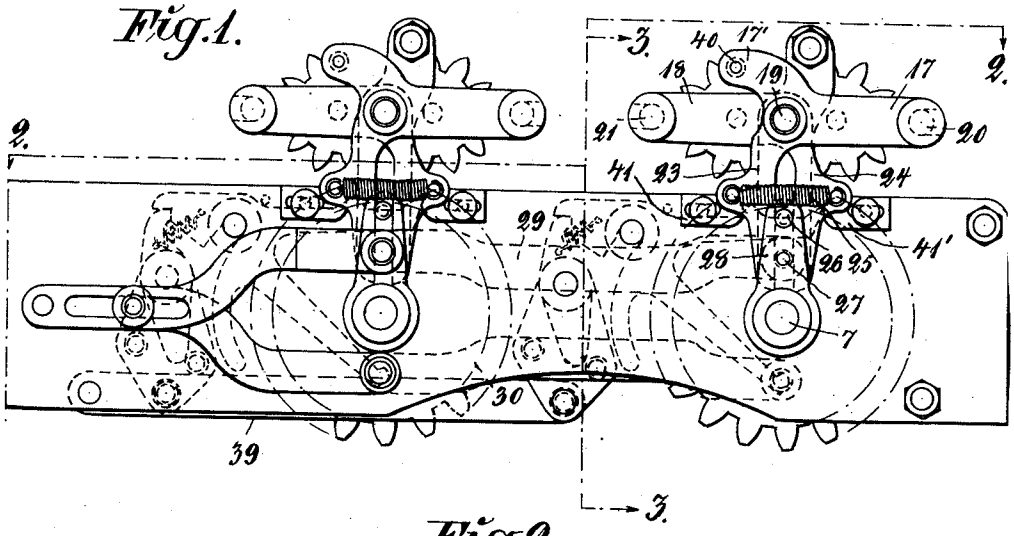
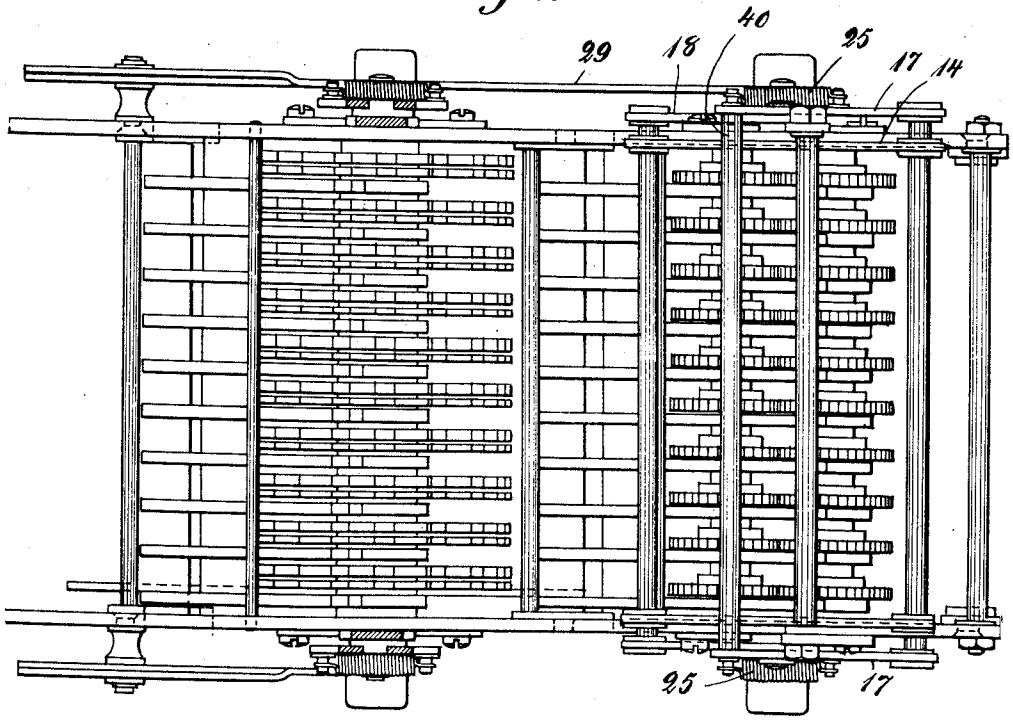


Fig. 2.



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Fig. 5.

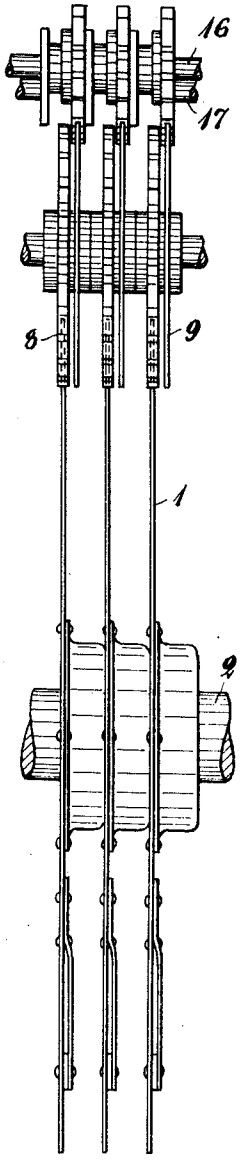


Fig. 6.

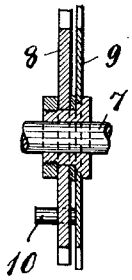


Fig. 7.

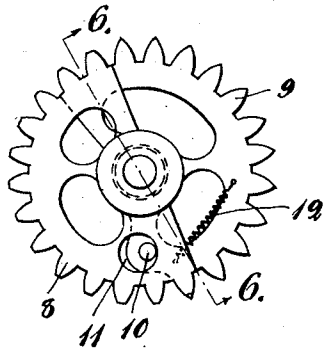
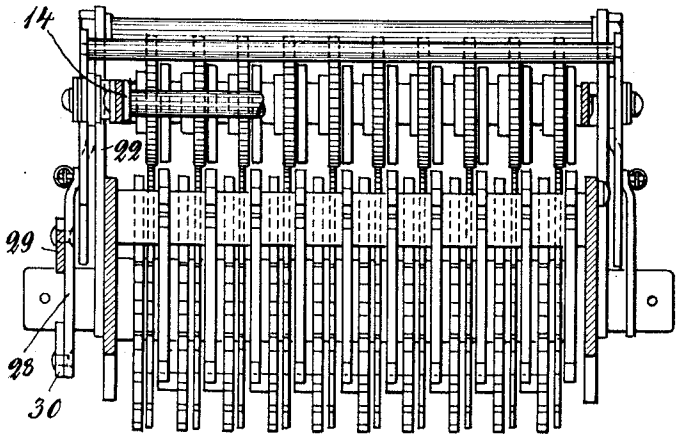


Fig. 3.



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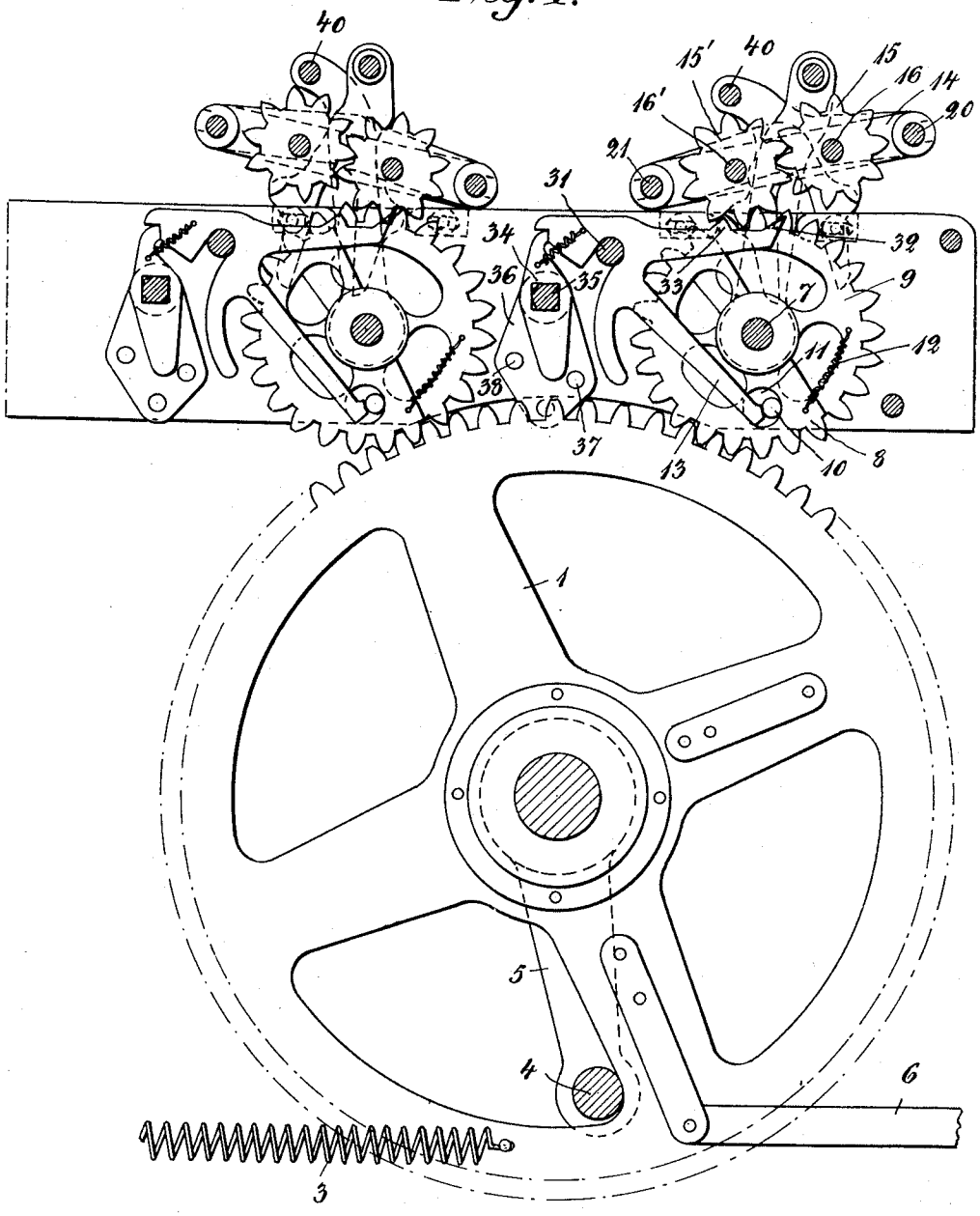
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Fig. 4.



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Fig. 8.

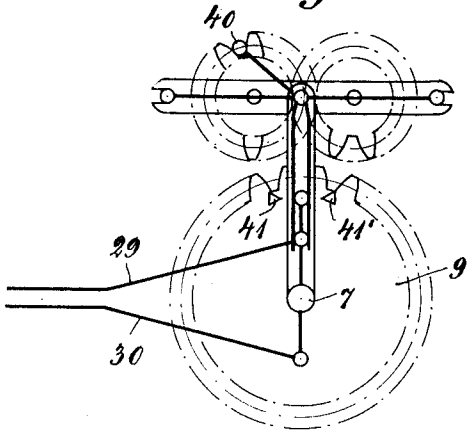


Fig. 9.

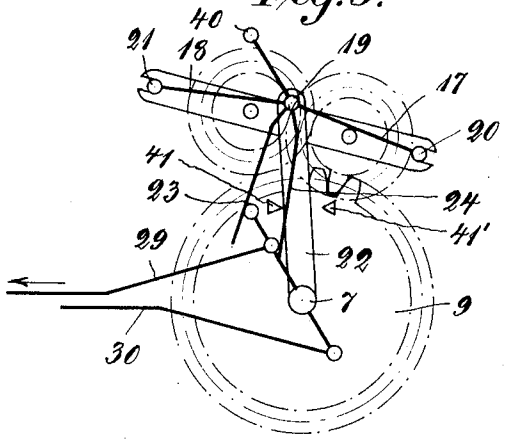
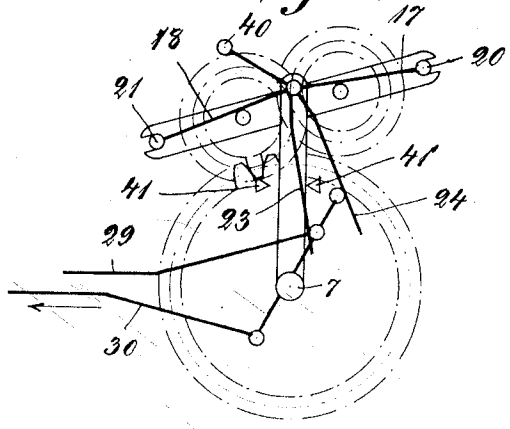


Fig. 10.



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Patented July 21, 1936 2,048,453

UNITED STATES PATENT OFFICE

2,048,453

CALCULATING MACHINE

Alfred Käll, Stockholm, Sweden, assignor to Telefonaktiebolaget L. M. Ericsson, Stockholm, Sweden, a company of Sweden

Application July 2, 1934, Serial No. 733,525
In Sweden July 1, 1933

6 Claims. (Cl. 235—60)

(Granted under the provisions of sec. 14, act of March 2, 1927; 357 O. G. 5)

The present invention relates to calculating and accounting machines, and relates more particularly to machines of the kind in which a totalizer comprising adding and subtracting wheels is adapted to be selectively shifted to different positions in which either the adding or the subtracting wheels are in engagement with a setting mechanism. The primary object of the invention is to provide a simplified arrangement for selectively shifting the totalizer to adding or subtracting position respectively.

According to the invention the totalizer is supported by coaxially pivoted arms which are connected pairwise in such a manner with the frame of the totalizer at opposite sides of a centre, about which said frame is to turn when shifted, that through the turning of the arms in relation to each other about their common centre the totalizer is subjected to a parallel displacement in a direction toward or away from the setting mechanism. The common pivot of the two arms is preferably adapted to be displaced laterally so that through the displacement of said pivot the totalizer is subjected to a parallel displacement substantially in a tangential direction in relation to the wheels of the setting mechanism.

An embodiment of a calculating machine according to the invention is illustrated in the accompanying drawings, in which

Figure 1 is a side view of two totalizers driven from a common setting mechanism,

Figure 2 is a plan view and Figure 3 an end view of the totalizers shown in Figure 1,

Figure 4 is a longitudinal section through the totalizers and the appertaining setting mechanism,

Figure 5 is an end view of the totalizers and the setting mechanism,

Figures 6 and 7 show details, and

Figures 8, 9, and 10 illustrate diagrammatically the shifting of the totalizer to intermediate position and to adding or subtracting position respectively.

The setting mechanism of the machine comprises a plurality of toothed setting discs 1 journalled on a common spindle 2. The wheels are actuated by springs 3 striving to rotate the same clockwise (Figure 4). Such movement is normally prevented by a spindle 4 supported by turnable arms 5 and extending through openings in the discs 1. The arms 5 are adapted under the action of the driving mechanism of the machine to perform a reciprocating oscillatory motion during which the setting discs 1 are released and permitted to rotate under the action of the springs 3, the rotating movements of the setting discs being limited by stop members which are set by means of the keyboard of the machine (not shown on the drawings). The stopping of the setting discs in the stopping positions marked by the keys and corresponding to the numerals set is effected through the intermedium of pull rods 6.

The setting mechanism described serves to set in common two separate totalizers which are mutually identical wherefore only one of said counters will be described in the following. The item transfer from the setting mechanism to the totalizers is accomplished by two groups of intermediate wheels which are journalled on two spindles 7 secured in a frame. As illustrated in Figures 4, 6, and 7 each intermediary wheel consists of two coaxial toothed segments 8, 9 which are adapted to be turned in relation to each other and are journalled close by each other. The segments 8 are permanently in engagement with the setting discs 1, whereas only in connection with item transfer operations the segments 9 are brought into engagement with the totalizers through the shifting of the latter. Normally, i. e. when no item transfer takes place, the two segments 8, 9 occupy the mutual positions shown in Figures 4 and 7. The segment 9 is provided with a pin 10 engaging in an opening of the segment 8 which opening has such a width that the movement of the two toothed segments relatively to each other is limited to one pitch. In the normal position shown in which the pin 10 is in engagement with the right hand edge of the opening 11, the segment 9 is held fast against the action of a tensioned spiral spring 12 extending between the two segments by an arm 13 extending from a corresponding tens transfer hook.

The counting wheels are arranged in a movable frame 14 and comprise two groups of counting wheels 15 and 15' journalled on spindles 16 and 16' in the frame. The wheels 15 are intended to be brought into engagement with the intermediate wheels during subtracting operations whereas the wheels 15' function in connection with adding operations. The totalizer frame 14 is supported at each end by two arms 17, 18 which are coaxially journalled on a pivot 19. The opposite ends of the arms engage by means of slits on pins or spindles 20, 21 projecting from the longitudinal sides of the frame 14. The common pivot for the arms 17, 18 is arranged at the upper end of a projecting supporting arm 22 which is journalled on the spindle 7 (Figure 3). From the arms 17, 18 depend fingers 23, 24 which by means of a spiral

spring 25 are compressed against two pins 26, 27 projecting from a crank 28 journalled on the spindle 7. The crank 28 is adapted to be rotated to the left and to the right by means of pull rods 29 and 30 respectively. As will be clear from Figure 1 the pins 26, 27 are located at different radial distances from the centre of rotation of the crank 28. Therefore, on rotation of the crank not only will a turning of the totalizer in its entirety be effected but at the same time the fingers 23, 24 will be forced apart against the action of the spring 25 as will be best understood from the diagrammatic Figures 8 to 10.

The above mentioned tens transfer hooks are pivoted on a spindle 31 and are each provided with two tens transfer teeth 32, 33 adapted to cooperate with corresponding tens transfer teeth on the adding or subtracting wheels 15 and 15' respectively. In the normal position shown in Figure 4 the tens transfer hooks are locked by spring detents 34 which are pivoted on a spindle 35 and normally engage the upper one of two corresponding stop notches in the corresponding tens transfer hook. Cooperating with the detents are restoring discs 36 which are provided with restoring pins 37, 38 and are adapted to be actuated by means of pull rods 39.

The arrangement operates in the following manner. After the item or number to be entered in the totalizer has been set by means of the keys the crank 5 which is driven by means of a motor or by hand performs a reciprocating motion, each one of the setting discs 1 then rotating under the action of its appertaining spring 3 through an angle corresponding to the numerical value marked by the corresponding stop abutment. During this rotary movement of the setting wheels the toothed segments 8 rotate together with the wheels. The segments 9 on the other hand do not take part in the first part of the movement of the setting discs and the segments 8, inasmuch as said segments 9 are still held by the springs 12 against the arms 13, and only after the setting discs and the segments 8 have moved one pitch are the segments 9 carried along. During the setting movement now described the totalizers still occupy the intermediate positions shown in Figure 1.

After the setting of the item has been completed the totalizers are shifted for addition or subtraction by pulling either of the pull rods 29 or 30. Hereby the crank 28 is rotated to the left or to the right respectively, the totalizers together with the arms then moving to begin with as a rigid system until each arm 22 strikes against either of the stops 41 or 41' (Figure 1). During the continued movement of the crank 28 the fingers 23, 24 will be forced apart by the pins 26, 27 in a manner best understood from Figures 9, 10. The result of the movement is that either the adding wheels 15 or the subtracting wheels 15' are brought into engagement with the segments 9. In Figure 4 the left totalizer is shifted for addition and the right one for subtraction, and in Figures 9 and 10 is shown diagrammatically how these two shiftings have been effected. In shifting the totalizers a lock bar 40 supported by projecting lugs 17' on the arm 17 is brought out of engagement with the totalizer as is also clear from Figures 8 to 10.

After the totalizers have been shifted to engaging positions the crank 5 performs its return movement (counter-clockwise in Figure 4), then restoring all setting wheels 1 from their positions as determined by the stop members to their initial positions. Each one of the setting discs 1 and each one of the intermediary wheel segments 8 then performs the same movement as before but in the opposite direction, said movement comprising a number of pitches which is one unit greater than the numeral to be transferred. If for instance the numeral to be transferred is 3 the movement of the setting disc and of the segment 8 comprises four pitches. On the return movement also the segment 9 is carried along then transferring to the totalizer the set numeral. Unless a tens transfer has taken place the movement of the segment 9 is stopped by the arm 13, the movement of the segment 9 corresponding in such a case exactly to the set numeral. If, on the other hand, a tens transfer has taken place the tens transfer hook and then also the arm 13 will have been forced out of the way and the spring detent 34 snapped into the lower notch in the tens transfer hook. In this case the segment 9 is brought along a further pitch, a tens transfer taking place.

Upon completed item transfer all shifted item transfer hooks are restored to their initial positions by means of the restoring discs 36, said discs being rotated through the action of the rods 39 counter-clockwise in Figure 4, the restoring pin 38 then restoring the spring detent 34 and the pin 37 restoring the appertaining tens transfer hook.

I claim:

1. In a calculating machine in combination an item differential mechanism, an accumulator frame, two sets of accumulator wheels mounted in said frame for alternative cooperation with the item differential mechanism, coaxially pivoted carrying arms for the frame, said arms being pairwise connected with the frame on opposite sides of a centre of rotation of the frame, and means for moving the arms of each pair through different angles so as to impart to the frame a rotation and a translation towards or away from the item differential mechanism in order to bring either of the sets of accumulator wheels into engagement with said mechanism.

2. In a calculating machine in combination an item differential mechanism, an accumulator frame, two sets of accumulator wheels mounted in said frame for alternative cooperation with the item differential mechanism, coaxially pivoted carrying arms for the frame, said arms being pairwise connected with the frame on opposite sides of a centre of rotation of the frame, and means for moving the arms of each pair both in the same direction through different angles so as to impart to the frame a rotation and a translation towards or away from the item differential mechanism in order to bring either of the sets of accumulator wheels into engagement with said mechanism.

3. In a calculating machine in combination an item differential mechanism, an accumulator frame, two sets of accumulator wheels mounted in said frame for alternative cooperation with the item differential mechanism, coaxially pivoted pairs of carrying arms for the frame pin and slot connections connecting the ends of each pair to the frame on opposite sides of a centre of rotation of the frame and means for moving the arms of each pair both in the same direction through different angles so as to impart to the frame a rotation and a translation towards or away from the item differential mechanism in order to bring either of the sets of accumulator wheels into engagement with said mechanism.

4. In a calculating machine in combination an item differential mechanism, an accumulator frame, two sets of accumulator wheels mounted in said frame for alternative cooperation with the item differential mechanism, coaxially pivoted pairs of carrying arms for the frame, the arms of each pair being connected to the frame on opposite sides of a centre of rotation of the frame, means for moving the arms of each pair both in the same direction through different angles so as to impart to the frame a rotation and a translation in a direction towards or away from the item differential mechanism, and means for moving the pivot of said carrying arms so as to impart to the frame an adjusting translation in another direction.

5. In a calculating machine in combination an item differential mechanism, an accumulator frame, two sets of accumulator wheels mounted in said frame for alternative cooperation with the item differential mechanism, coaxially pivoted pairs of carrying arms for the frame, the arms of each pair being connected with the frame on opposite sides of a centre of rotation of the frame, extensions extending substantially parallelly from the arms of one pair of arms, a shifting crank, two pins projecting from said crank, a spring compressing said extensions about the pins so as to cause the arms of each pair to be turned both in the same direction through different angles upon rotation of the shifting crank.

6. In a calculating machine in combination an item differential mechanism, an accumulator frame, two sets of accumulator wheels mounted in said frame for alternative cooperation with the item differential mechanism, coaxially pivoted pairs of carrying arms for the frame, the arms of each pair being connected to the frame on opposite sides of the centre of rotation of the frame, means for moving the arms of each pair both in the same direction through different angles, a block bar connected with one of the carrying arms of each pair so as to be brought in and out of blocking engagement with the accumulator wheels upon rotation of said arm.

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