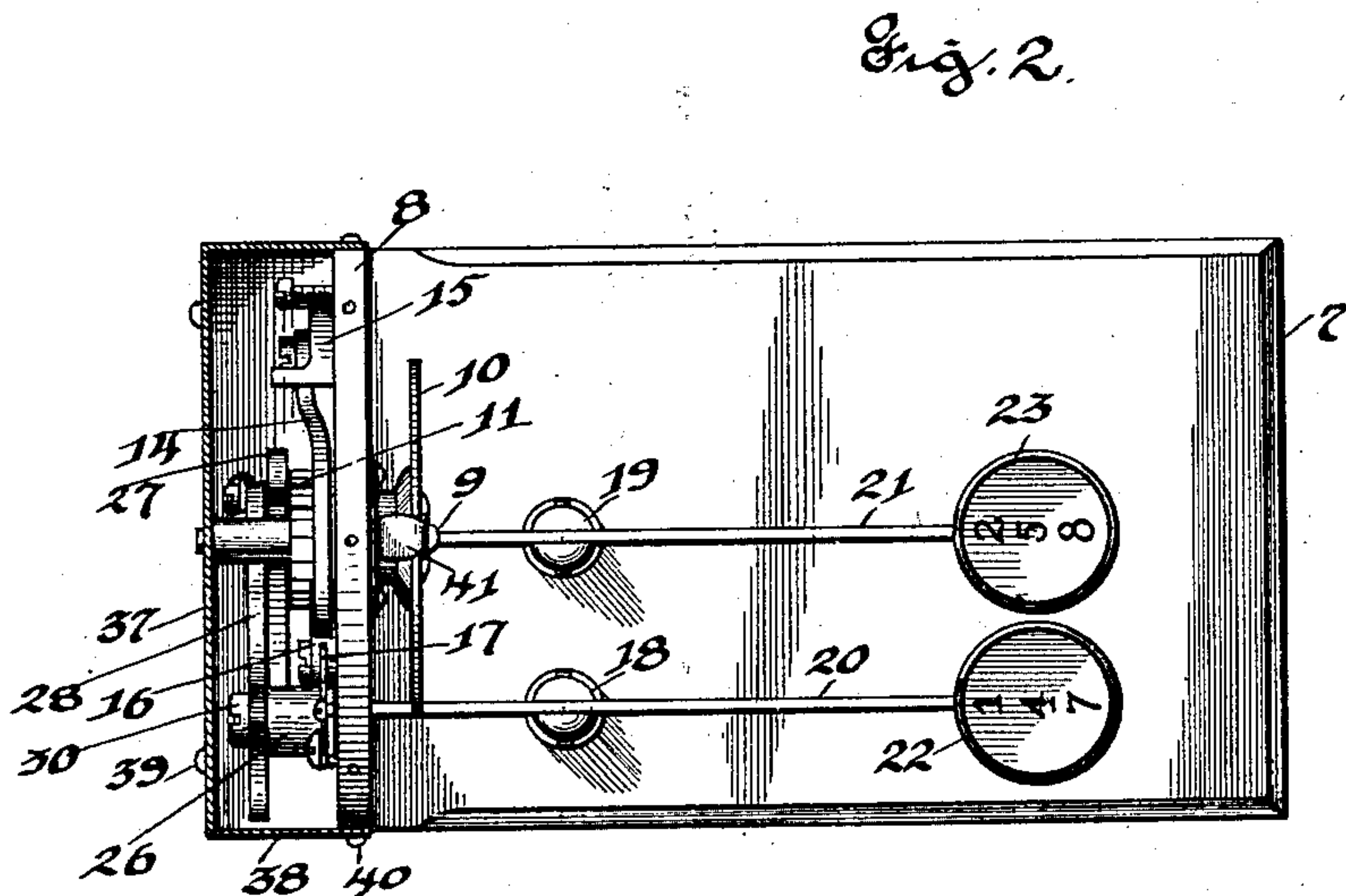
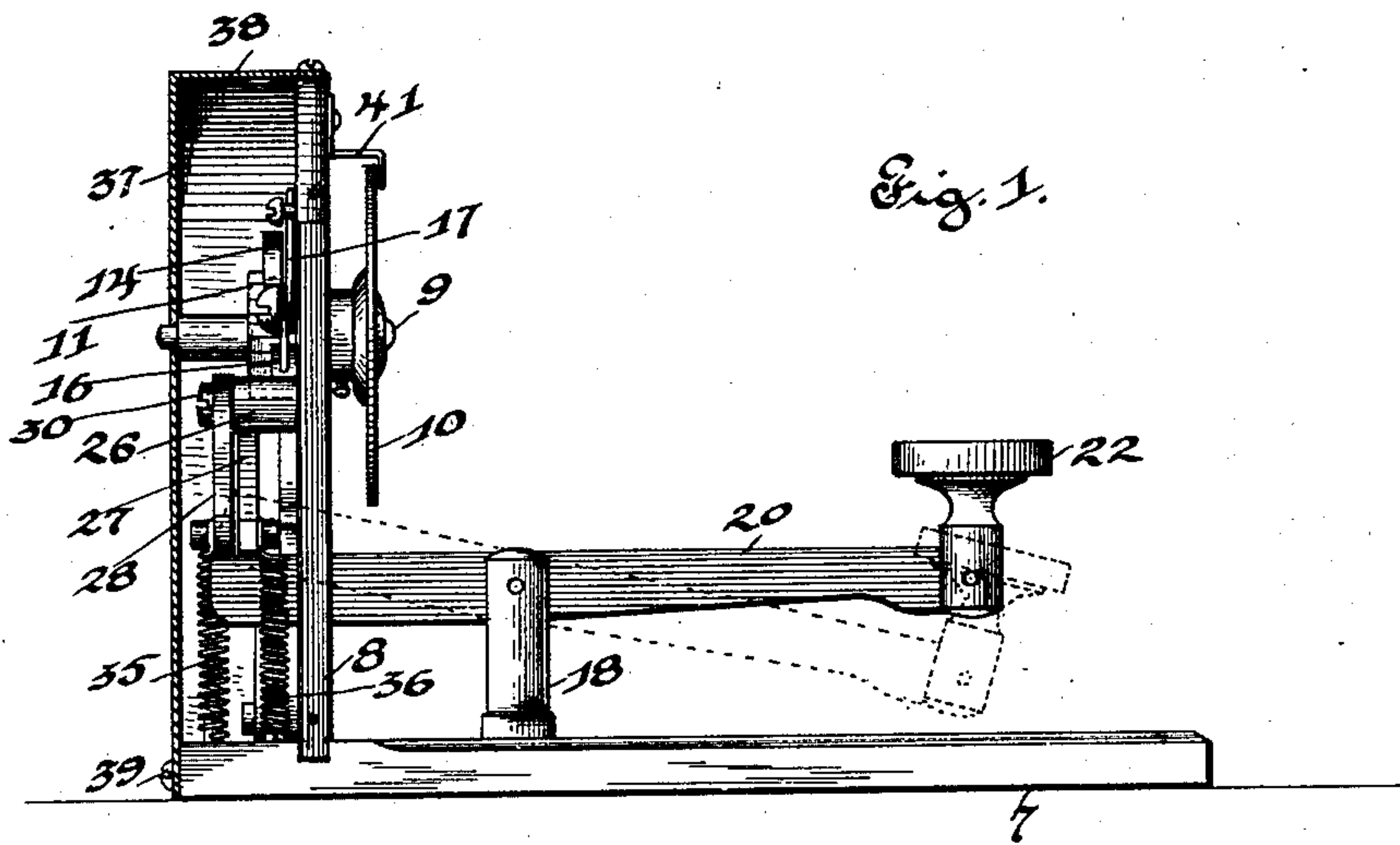


H. E. BROWN.
ADDITION TESTER.

APPLICATION FILED JUNE 23, 1902.

NO MODEL.

3 SHEETS—SHEET 1.



Witnesses
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Inventor
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3 SHEETS—SHEET 2.

Fig. 3

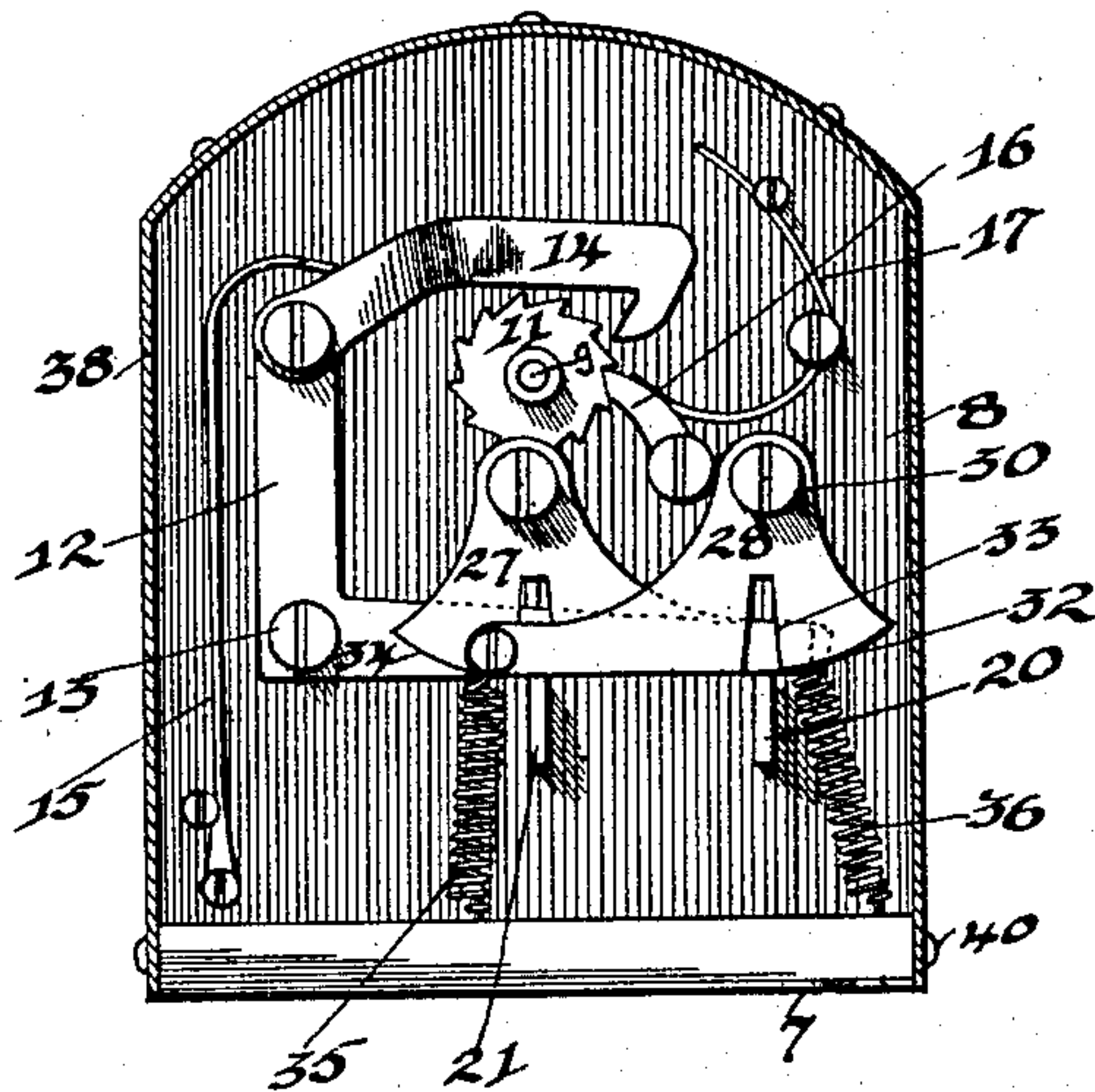
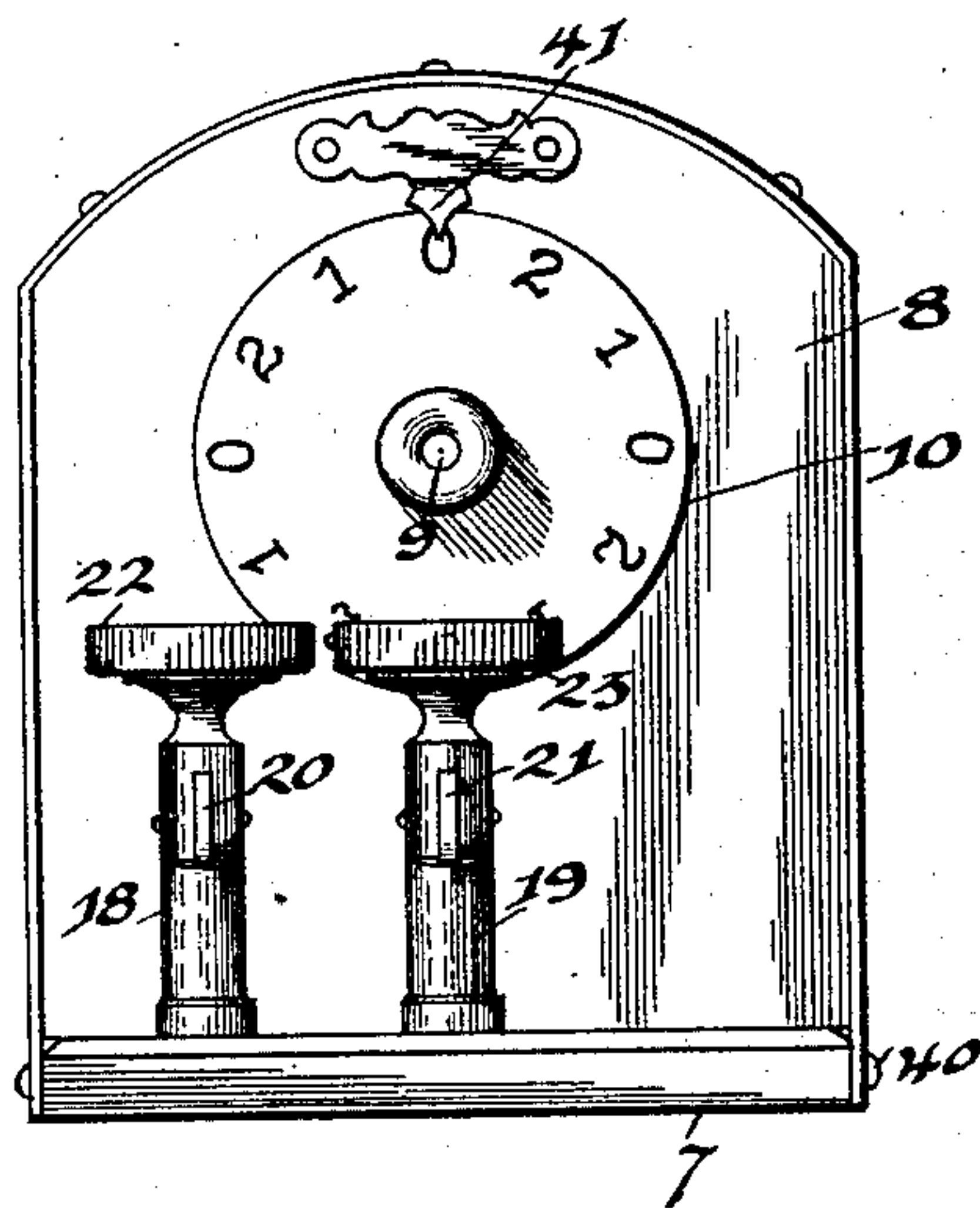


Fig. 4.



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3 SHEETS—SHEET 3.

Fig. 5.

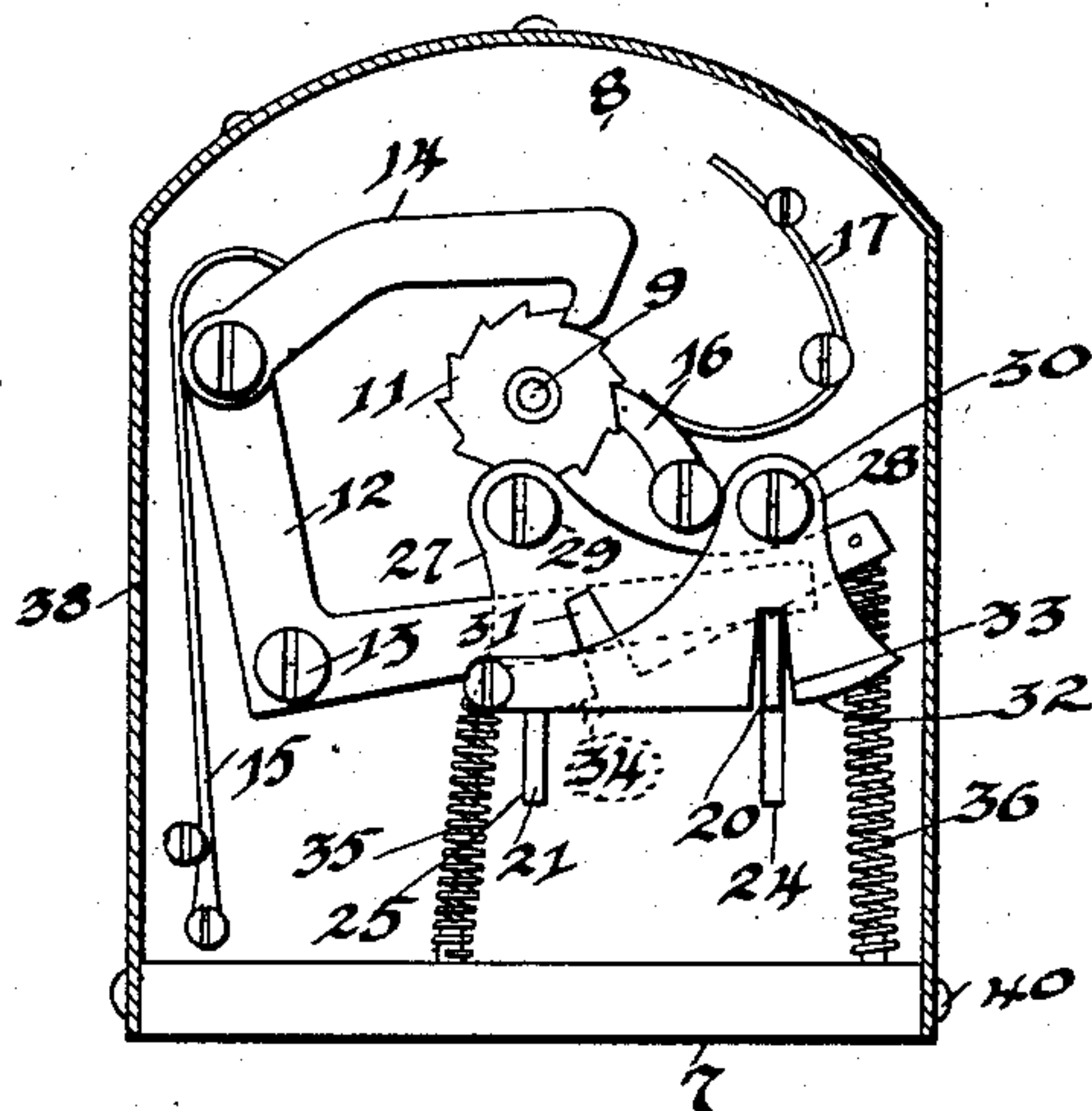
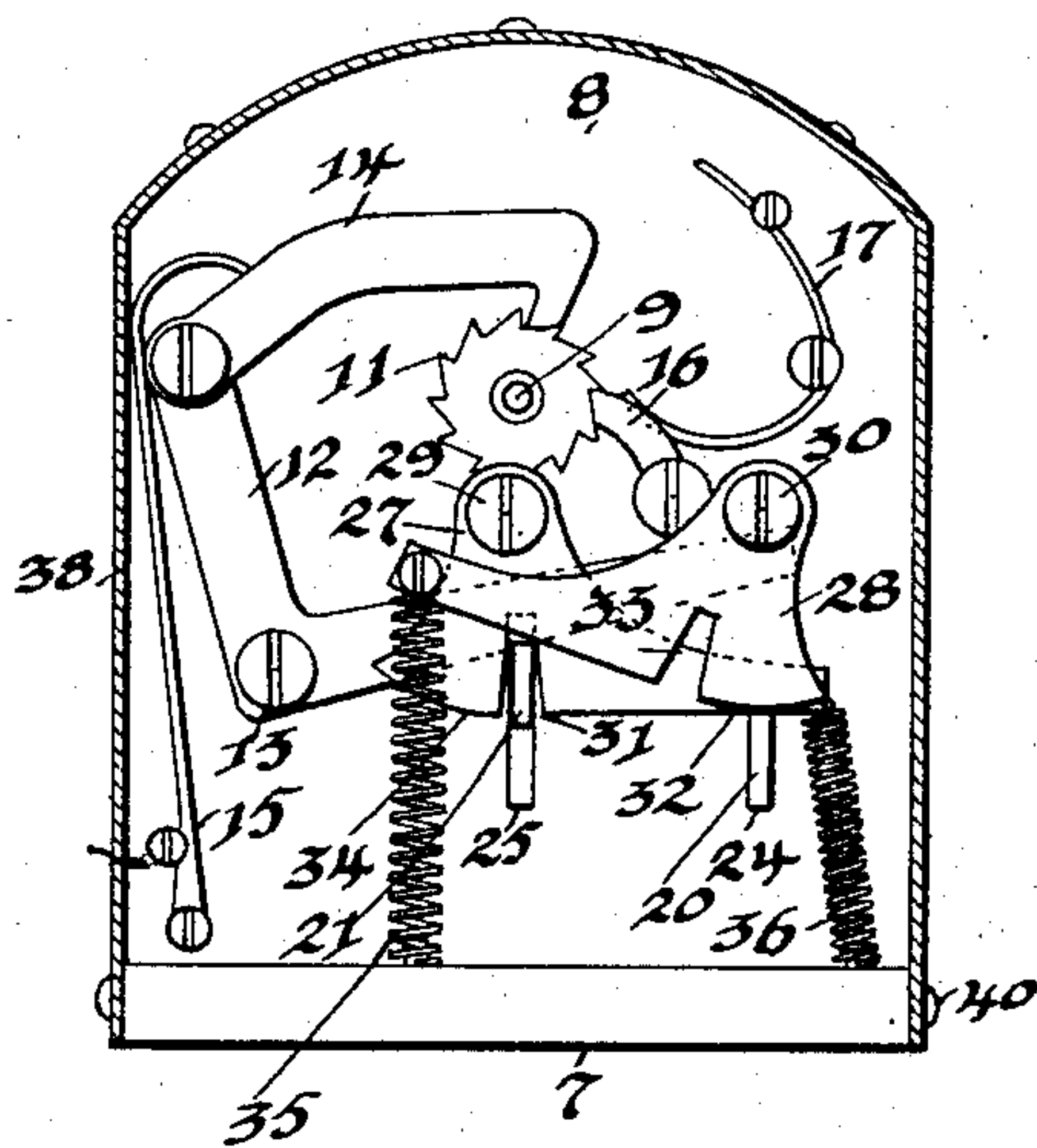


Fig. 6.



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UNITED STATES PATENT OFFICE.

HUGH ERNEST BROWN, OF COLUMBIA, MISSOURI.

ADDITION-TESTER.

SPECIFICATION forming part of Letters Patent No. 719,734, dated February 3, 1903.

Application filed June 23, 1902. Serial No. 112,889. (No model.)

To all whom it may concern:

Be it known that I, HUGH ERNEST BROWN, of the city of Columbia, Boone county, State of Missouri, have invented certain new and
5 useful Improvements in Addition-Testers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My object is to make an addition-tester;
10 and my invention consists of the novel features herein shown, described, and claimed.

Figure 1 is a side elevation of a machine embodying the principles of my invention, the casing being shown in section. Fig. 2 is
15 a top plan view of the parts shown in Fig. 1, the casing being shown in section. Fig. 3 is a rear elevation of the mechanism, the casing being shown in section. Fig. 4 is a front elevation. Fig. 5 is a view analogous to Fig.
20 3 and showing the operation of the first key. Fig. 6 is a view analogous to Fig. 5 and showing the operation of the second key.

Referring to the drawings in detail, the base
7 is a flat rectangular plate, and the supporting-wall 8 extends upwardly from near the
25 rear end of the plate. The indicator-shaft 9 is mounted horizontally in the supporting-wall 8 near its center, and the indicator 10 is fixed upon the shaft 9 in front of the wall 8.
30 A ratchet-wheel 11 is fixed upon the shaft 9 back of the wall 8. A bell-crank lever 12 is pivotally mounted upon the screw 13, which is inserted through the lever and screw-seated in the wall 8, so that one arm of the lever is
35 substantially in a horizontal position and the other end of the lever is in a vertical position, as shown in Fig. 3. A pawl 14 is pivotally connected to the upper end of the bell-crank lever and in position to engage and operate the ratchet-wheel 11. A leaf-spring 15
40 is secured to the wall 8 and extends upwardly and laterally in position to engage the upper end of the bell-crank lever and the pawl 14, the tension of said spring being exerted to
45 hold the pawl in engagement with the ratchet-wheel and to hold the bell-crank lever in its normal position. A retaining-pawl 16 is secured to the wall 8 in position to engage the ratchet-wheel 11 and hold it from back action.
50 The leaf-spring 17 is attached to the wall 8 and engages the pawl 16 to hold the

pawl in engagement with the ratchet-wheel. Key-posts 18 and 19 are secured to the base 7 in front of the wall 8, and keys 20 and 21 are pivotally connected to the posts, there being
55 buttons 22 and 23 upon the forward ends of said keys and the rear ends of said keys passing through slots 24 and 25 in the wall 8, so that the horizontal arm of the bell-crank lever 12 normally rests upon said rear ends
60 of the keys. The slots 24 and 25 limit the motion of the respective keys, so that when the first key-button 22 is depressed the pawl 14 will rotate the ratchet-wheel 11 one point and when the second key-button 23 is depressed the ratchet-wheel will be rotated two
65 points. Spacing-blocks 26 extend backwardly from the wall 8, and locking-dogs 27 and 28 are secured to the spacing-blocks by means of the screws 29 and 30, said locking-dogs being
70 crossed. The free end of the dog 27 rests upon the rear end of the key 20, and the free end of the dog 28 rests upon the rear end of the key 21. When the key-button 23 is depressed, the rear end of the key passes into the
75 slot 31 in the dog 27 and elevates the free end of the dog 28, thus bringing the locking-surface 32 of the dog 28 on top of the rear end of the key 20 and locking said keys, as shown
80 in Fig. 6. When the key-button 22 is depressed, the rear end of the key 20 passes into the slot 33 of the dog 28 and elevates the free end of the dog 27, thus bringing the locking-surface 34 of the dog 27 on top of the rear end of the key 21 and locking said key, as shown
85 in Fig. 5. Thus it will be seen that only one key can be operated at a time. A retractile coil-spring 35 connects the free end of the dog 28 to the base 7, and a similar spring 36 connects the free end of the dog 27 to the
90 base. A sheet-metal casing comprising the rear wall 37 and flange 38 is secured to the base by means of screws 39 and secured to the wall 8 by means of screws 40, as required to cover the mechanism mounted upon the
95 rear side of the wall 8. The rear end of the shaft 9 has a bearing in the casing.

Upon the face of the indicator 10 and near its rim appear the numbers 2 1 0 in series. I have shown four series of these numbers;
100 but one or more series may be used, as desired. A pointer 41 is secured to the wall 8

and extends forwardly and downwardly in front of the indicator. The ratchet-wheel 11 has a number of teeth equal to the number of numbers upon the indicator 10, which must
 5 be three or a multiple of three. Any number or the sum of any series of numbers when divided by three will leave as a remainder either naught, one, or two. In the multiple-
 10 of-three test of addition the threes and multiples of three are cast out of the digits of the numbers added, and the final remainder is called the "check-figure." Then the threes and multiples of three are cast out of the digits of the sum, and the remainder is the sec-
 15 ond check-figure. If the two check-figures are the same, no error unless an error or errors of three or a multiple of three has been made in the addition; but if the two check-figures are different then this indicates that
 20 an error has been made.

In order to employ this test without a machine, the operation is as follows: Begin with the left-hand digit at the top of the column of numbers to be added, disregard the naughts,
 25 threes, sixes, and nines and add the remaining digits, drop the threes or multiples of three after each addition. Take the following example:

	457
	218
	804
	369
	<hr/>
	1,848

35 Begin with the upper left-hand figure 4; drop 3 from 4; add the remainder, 1, to 5; drop 6 resulting; drop 6 from 7; add the remainder, 1, to 2; drop the 3 resulting; add 1 to the 8,
 40 and drop 9 resulting; drop 6 from 8; add the remainder, 2, to the 4; disregard the 0; drop the resulting 6 and disregard 3, 6, and 9, and we have as the first check-figure 0. Now take the sum, 1,848, begin with the left-hand fig-
 45 ure, 1; add the 8; drop the resulting 9; drop 3 from 4; add the remainder, 1, to 8; drop the 9, and we have as the second check-figure 0. The two check-figures agreeing proves unless
 50 an error or errors of three or a multiple of three have been made that the addition is correct. The same result is secured by casting the threes out of the sums of the remainders. This operation is performed by my machine
 55 in the following manner: Upon the first key-button 22 I place the numbers 1, 4, and 7, and upon the second key-button 23 I place the numbers 2, 5, and 8, disregarding 3, 6, 9, and 0. When the threes are cast out of 4 and 7,
 60 the remainder in either case is 1. Consequently I place 4 and 7 on the same key-button with the figure 1, and this key-button is upon the key which moves the indicator one point. When the threes are cast out of 5 and 8, the remainder in each case is 2. Conse-
 65 quently I place the 2, 5, and 8 upon the second key-button upon the lever, which moves

the indicator two points. Now set the indi-
 cator at 0. Referring to the above example, strike the first key which has 4 upon it, and the indicator is moved one point. Then
 70 strike the second key which has 5 upon it, and the indicator is moved two points. Then strike the first key which has 7 upon it, and the indicator is moved one point. Then strike the button having 2 upon it, and the
 75 indicator is moved two points. Then strike the button having 1 upon it, and the indicator is moved one point. Then strike the button having 8 upon it, and the indicator is moved two points. Then strike this button
 80 again for the second 8, moving the indicator two more points. Disregard the 0. Strike the button having 4 upon it, moving the indicator one point. Disregard 3, 6, and 9, and the indicator stands at 0, so the first check-num-
 85 ber is 0. Now take the sum 1,848. Strike the key having 1 upon it, moving the indicator one point. Then strike the key having 8 upon it, moving the indicator two points. Then strike the key having 4 upon it, mov-
 90 ing the indicator one point. Then strike the key having 8 upon it, moving the indicator two points. Then we have as the second check-figure 0. The two check-figures being alike, the addition is correct unless there
 95 is an error or errors of three or a multiple of three. This operation may be performed very readily upon the machine and without any other mental action than the selection of the keys and the disregarding of the threes,
 100 sixes, nines, and naughts. In testing the series of figures the machine should be started from 0 in the first instance. Then if the first check-figure is 0 the machine should be started from 0 to find the second check-fig-
 105 ure; but if the first check-figure is 1 the machine may be started from 1 by striking the key numbered 1 before beginning to strike for the digits in the series to find the second check-figure, in which case it will stop upon
 110 0 if the addition is correct. In like manner if the first check-figure is 2 the machine may be started from 2 by striking the key numbered 2 upon striking for the digits in the sum to find the second check-figure, and if
 115 the addition is correct it will stop upon 0. This does away with the necessity of remembering or recording the first check-figure, as it is only necessary to remember that if the addition is correct the machine will stop upon
 120 0. On the other hand, if the machine is started at 0 all the time the first check-figure must be remembered and recorded, and then the machine must stop on this figure if the addition is correct.
 125

The essential elements of my addition-
 tester are two keys, an indicator divided into three spaces or a multiple of three spaces, said spaces being marked 0, 1, and 2 in series, and a connection between the keys and
 130 the indicator, whereby one key will move the indicator one point and the other key will

move the indicator two points, the numbers 1, 4, and 7 being upon the first key and the numbers 2, 5, and 8 being upon the second key.

I claim—

5 1. An addition-tester, comprising two keys independently mounted; an indicator divided into three spaces or a multiple of three spaces; and a connection between the keys and the indicator, whereby one key will move the in-
10 dicator one point, and the other key will move the indicator two points; substantially as specified.

2. An addition-tester, comprising two keys independently mounted; an indicator suit-
15 ably spaced; a wheel having three teeth or a multiple thereof, connections between the indicator and the keys, whereby one key will move the indicator one point, and the other key will move the indicator two points; and
20 means of locking the keys so that only one key can be moved at a time; substantially as specified.

3. An addition-tester, comprising two keys independently mounted; an indicator divided
25 into suitable spaces, said spaces being marked 0, 1 and 2 in series; connections between the indicator and the keys, whereby one key will move the indicator one point and the other key will move the indicator two points; the
30 numbers 1, 4 and 7 accompanying the first key; and the numbers 2, 5 and 8 accompanying the second key; substantially as specified.

4. In an addition-tester, a shaft suitably
35 mounted; an indicator upon the forward end

of the shaft; a ratchet-wheel upon the shaft and having three teeth or a multiple thereof; a bell-crank lever pivotally mounted; a pawl connecting one end of the bell-crank lever to the ratchet-wheel; and two keys pivotally
40 mounted for operating the bell-crank lever; substantially as specified.

5. In an addition-tester, a shaft suitably mounted; an indicator upon the forward end
45 of the shaft; a ratchet-wheel upon the shaft and having three teeth or a multiple thereof; a bell-crank lever pivotally mounted; a pawl connecting one end of the bell-crank lever to the ratchet-wheel; two keys pivotally mount-
50 ed for operating the bell-crank lever; and means of locking one key by the operation of the other key, so that only one key can be operated at a time; substantially as specified.

6. In an addition-tester, two keys; an indicator divided into three spaces or a multi-
55 ple of three spaces, said spaces being marked 0, 1 and 2 in series, and a connection between the keys and the indicator, whereby one key will move the indicator one point, and the other key will move the indicator two points,
60 the numbers 1, 4 and 7 being upon the first key, and the numbers 2, 5 and 8 being upon the second key, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

HUGH ERNEST BROWN.

Witnesses:

J. W. McBRIDE,
W. F. HODGE.