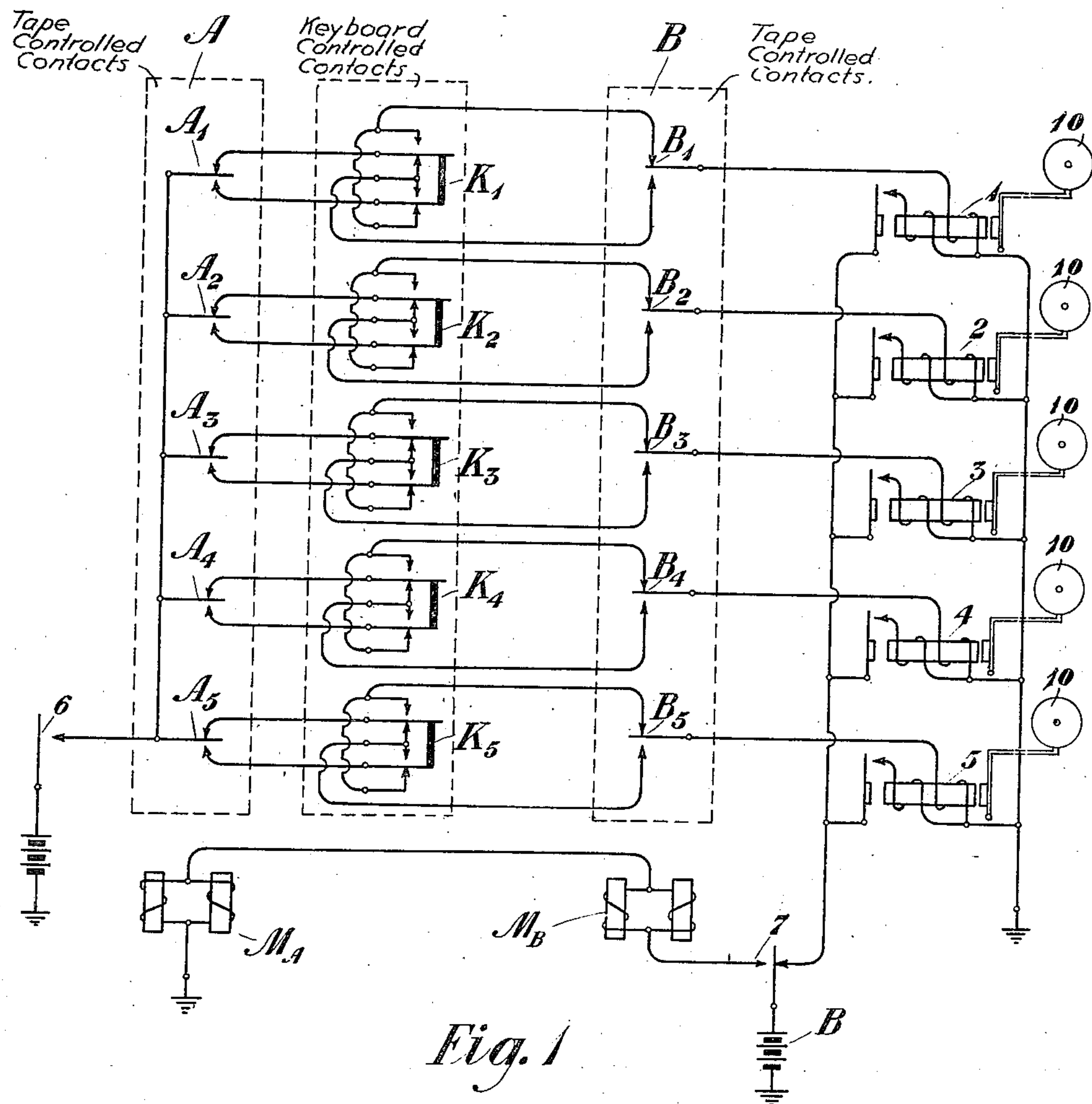


Jan. 23, 1923.

R. D. PARKER.
CIPHERING MACHINE.
FILED MAY 26, 1920.

1,442,819

2 SHEETS-SHEET 1



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2 SHEETS-SHEET 2

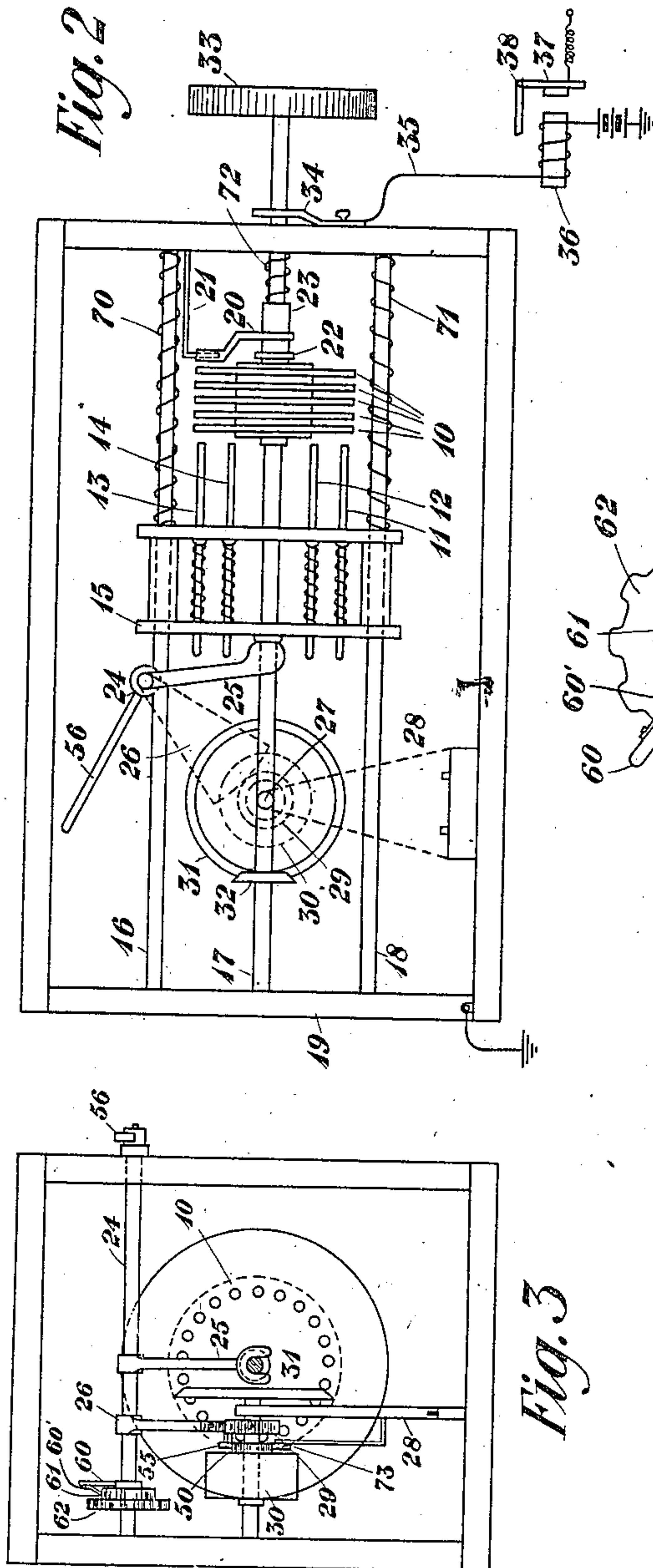


Fig. 2

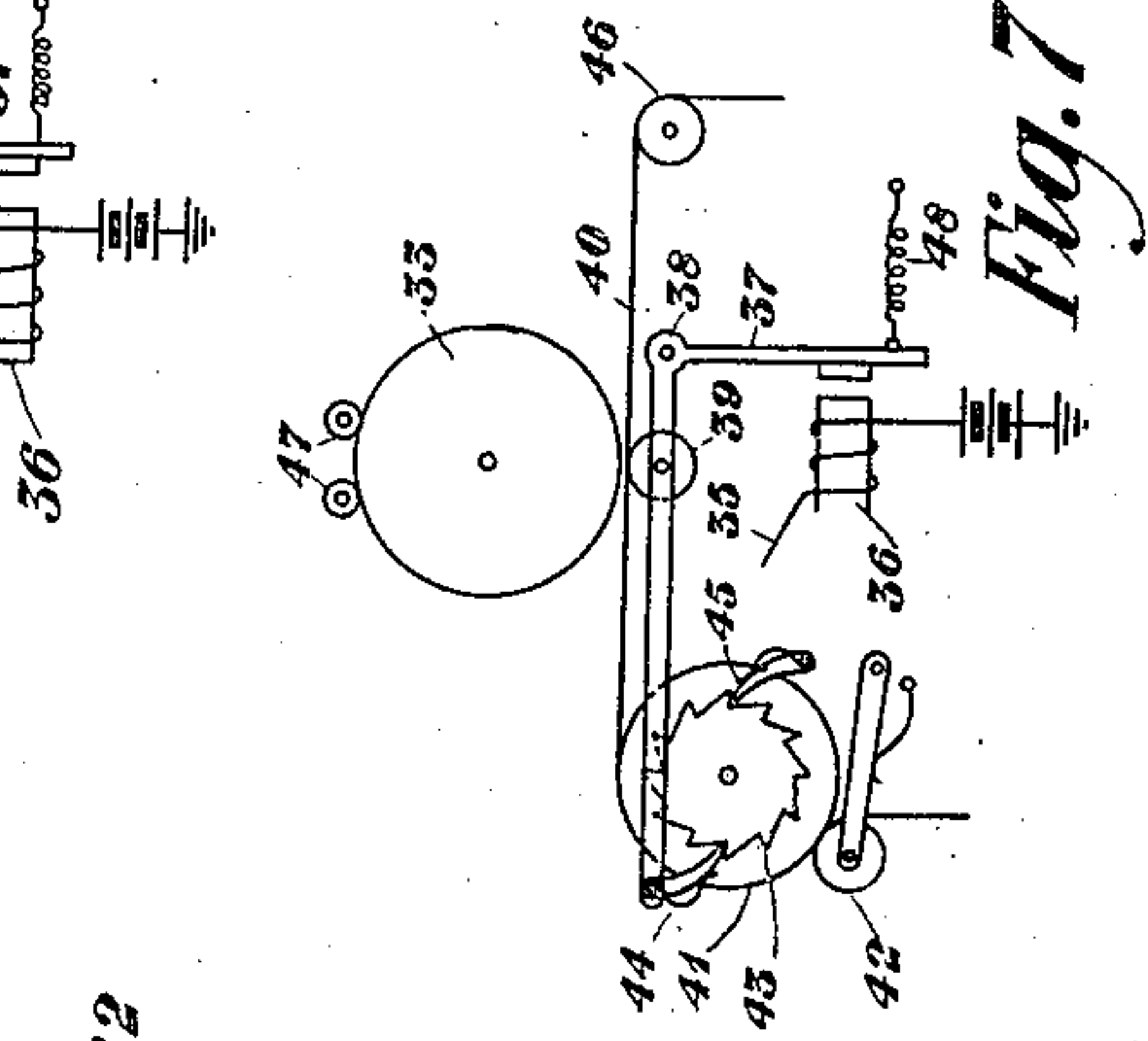


Fig. 7

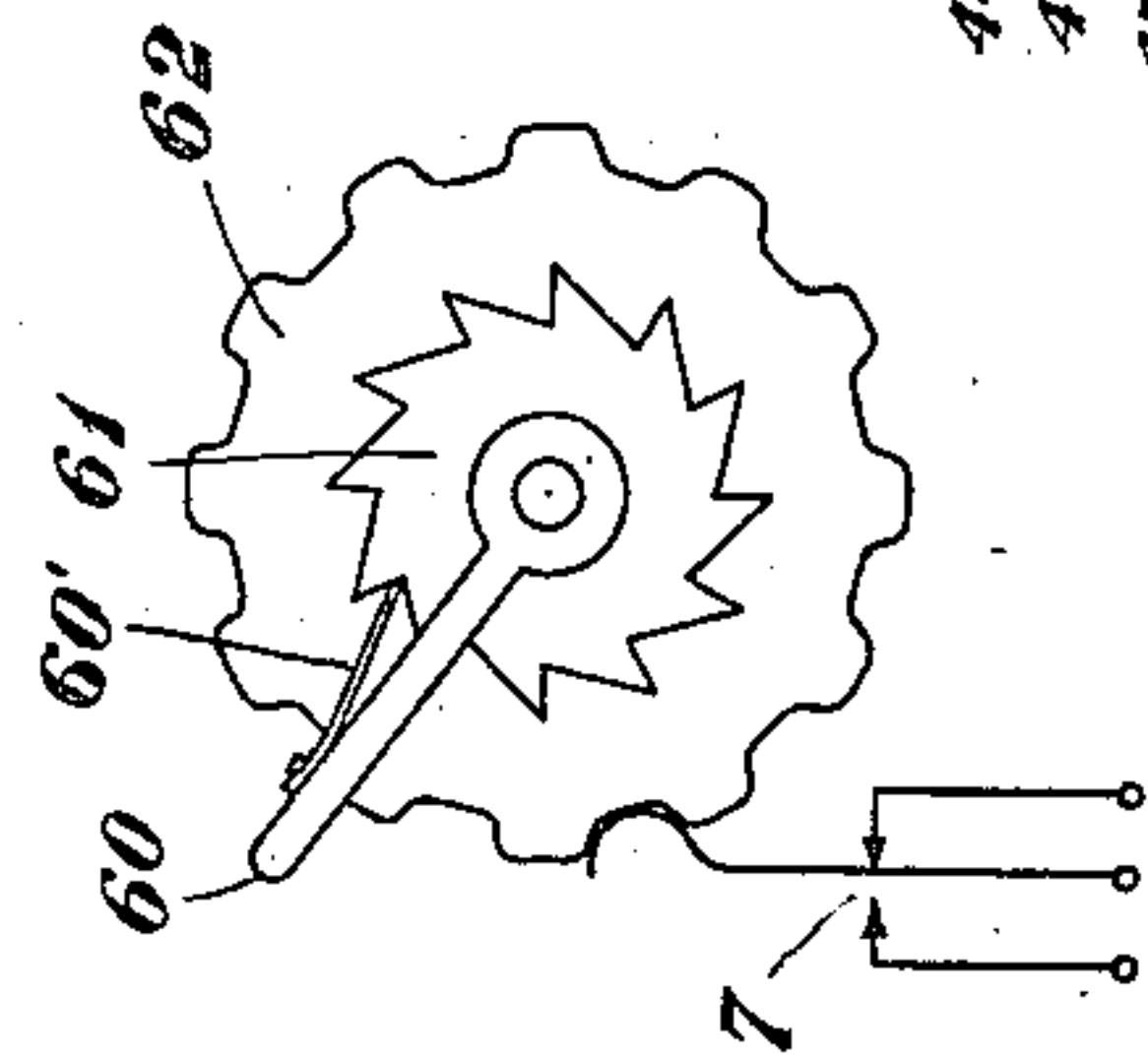


Fig. 6

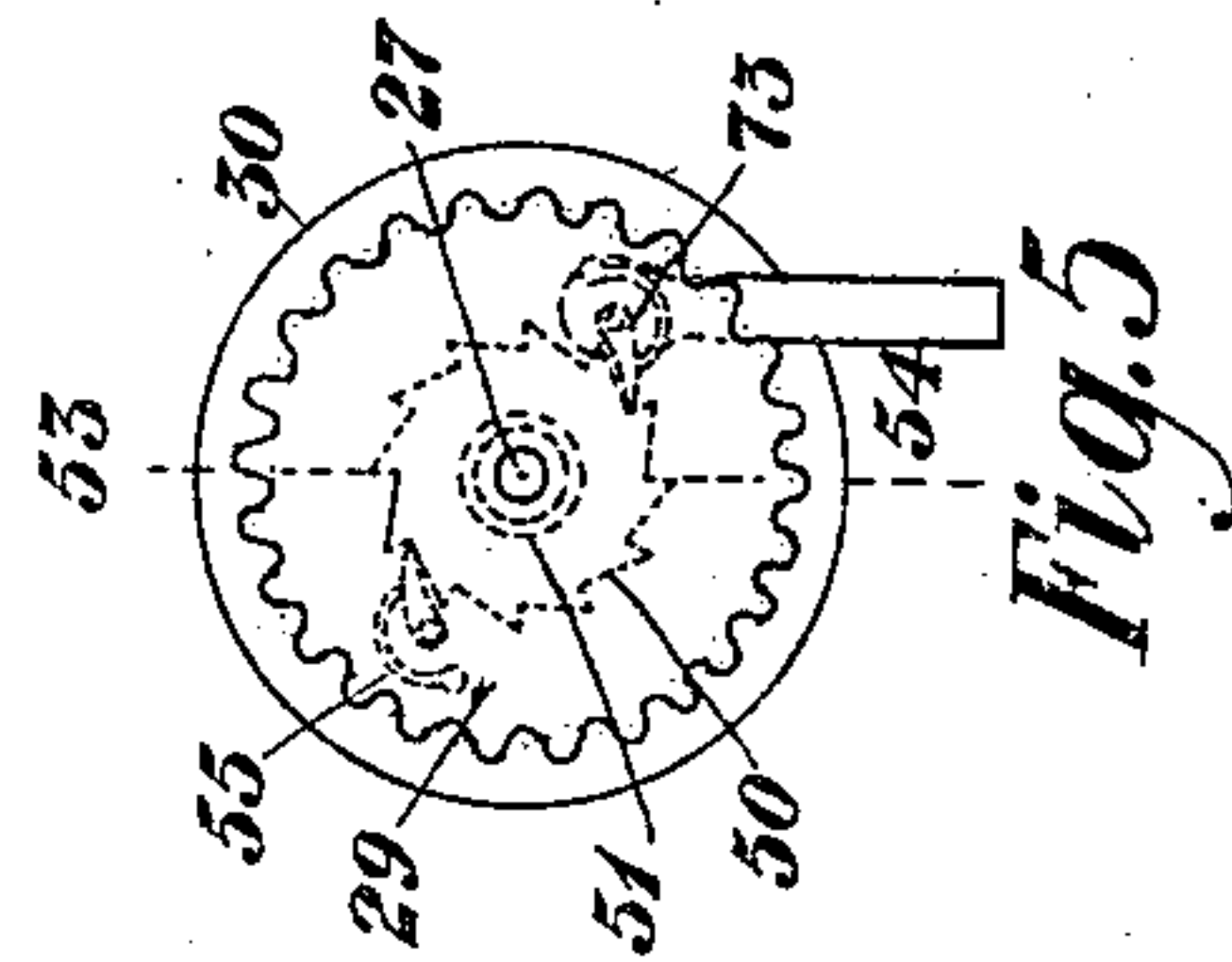


Fig. 5

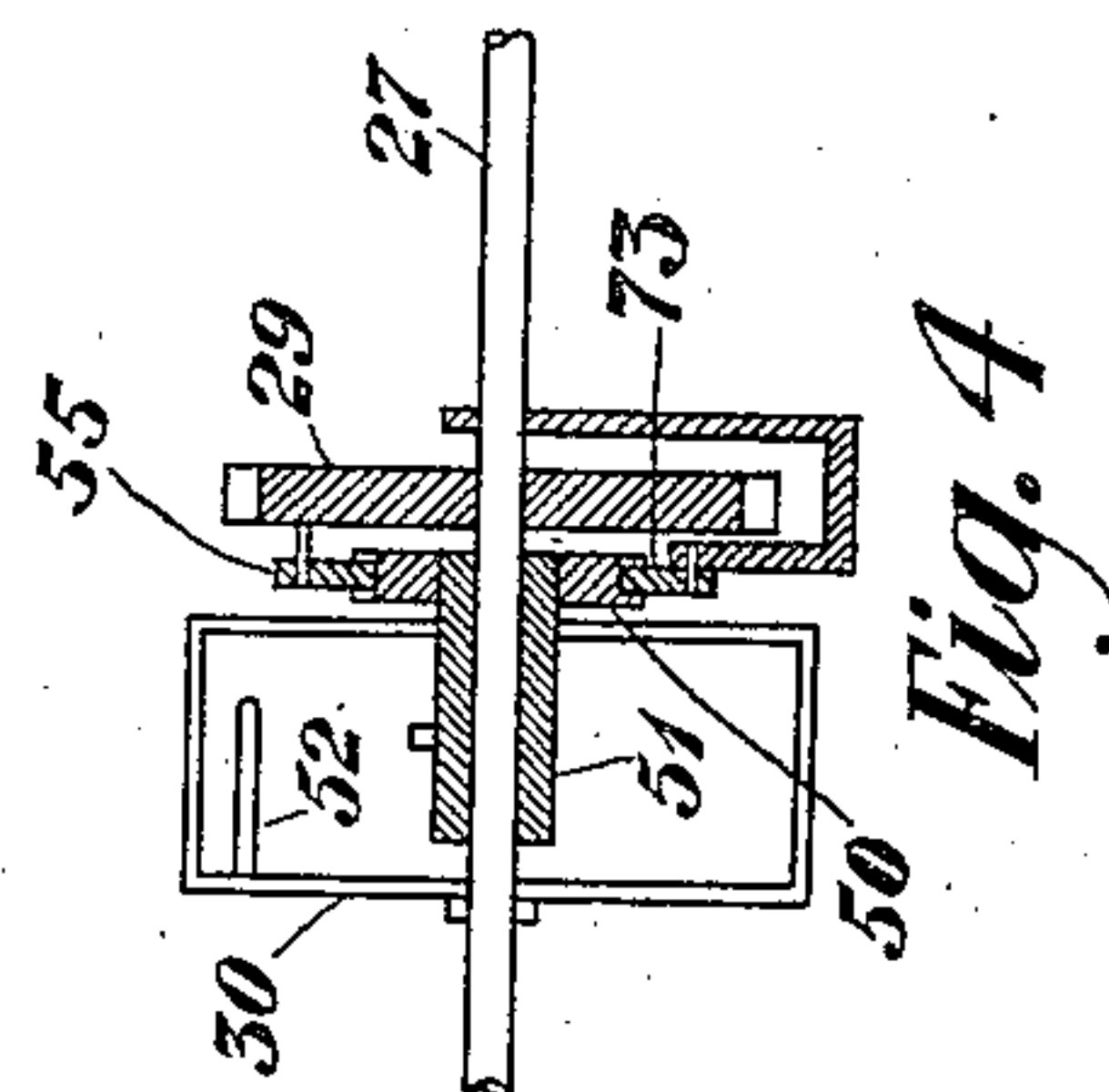


Fig. 4

Fig. 3

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UNITED STATES PATENT OFFICE.

RALZEMOND D. PARKER, OF BROOKLYN, NEW YORK, ASSIGNOR TO AMERICAN TELEPHONE AND TELEGRAPH COMPANY, A CORPORATION OF NEW YORK.

CIPHERING MACHINE.

Application filed May 26, 1920. Serial No. 384,329.

To all whom it may concern:

Be it known that I, RALZEMOND D. PARKER, residing at Brooklyn, in the county of Kings and State of New York, have invented certain Improvements in Ciphering Machines, of which the following is a specification.

This invention relates to arrangements for enciphering and deciphering code messages and more particularly relates to arrangements for enabling one to operate a device of this character without a knowledge of the code utilized.

A former method of enciphering code messages, such as telegraph messages in which the characters are represented by different code combinations, has been to combine the code combinations of the original message with code combinations of one or more key tapes, and to give a visual indication in code formation of the effect produced by such combination. One of the arrangements for accomplishing such a result consists of a plurality of signaling devices, the circuits for controlling which are completed over the contacts of one or more tape transmitters and a set of manually operable keys. The operator would set up on the keys a code combination representing a character of the original message and the signaling devices, due to the combined operation of the keys and tape transmitters, would indicate the code combination of the enciphered message. It would then be necessary to write down the code combinations thus indicated by the signaling devices to record the enciphered message, which might then be transmitted by any desired means. With the above arrangements it would be essential for the operator to have a knowledge of and to memorize the code utilized both in order to set up the original message on the keys and to write down the enciphered code combinations. It is one of the purposes of this invention to provide arrangements for obviating these last mentioned operations and by accomplishing such arrangements mechanically enable one to operate the device without a knowledge of the code utilized and without possibility of translation errors. Other purposes and features of the invention will appear more

fully from the detailed description hereinafter given.

The device of this invention utilizes the principles heretofore mentioned in that the code combinations representing characters of the original message are combined in effect with the code combinations of one or more key tapes to produce the enciphered message. The characters of the original messages may be set up in code formation on the device by the operation of a plurality of keys, each key representing a letter of the alphabet. These keys are associated with a well known form of sliding bar mechanism similar to that on a perforating machine or a keyboard transmitter and this sliding bar mechanism will set up on a series of contacts the code combination representing the character of the original message. This code combination will then be combined in effect with the code combinations of one or more key tapes and will set up an enciphered code combination on a plurality of magnets. These selecting magnets may in turn control any well known form of selecting mechanism to operate a type wheel to indicate the character represented by the enciphered code combination set up on the magnets. Furthermore a tape and suitable inking mechanism may be associated with the type wheel, if desired, in order to print the characters of the enciphered message directly.

The invention may be more fully understood from reference to the accompanying drawing in the Figs. 1, 2, 3, 4, 5, 6 and 7 of which are illustrated arrangements embodying the invention. In Fig. 1 is shown the circuit arrangement whereby the code combinations of the original message are combined in effect with the code combinations of two key tapes to set up on a plurality of selecting magnets the code combination of the enciphered message. In Fig. 2 is shown a side elevation of the selecting mechanism, which is controlled by the selecting magnets of Fig. 1, and which in turn controls the type wheel. Fig. 3 is an end elevation of Fig. 2. In Fig. 4 is shown a detailed perspective view of the spring mechanism utilized to rotate the type wheel shaft. Fig. 5 is an end view of the spring

mechanism of Fig. 4. Fig. 6 is an enlarged view of switching arrangements which will be described later. In Fig. 7 is illustrated a printing magnet, tape, and inking mechanism which may be associated with the type-wheel when it is desired to record the enciphered message directly in printed form.

In the circuit arrangement illustrated in Fig. 1 there is provided a plurality of keys or switches K_1, K_2, K_3, K_4 and K_5 upon which the code combinations representing characters of the original message will be set up. As has been pointed out these switches are arranged to be operated by a sliding bar mechanism similar to that on a standard perforator or keyboard transmitter, which mechanism in turn includes a plurality of keys representing letters of the alphabet. This arrangement has not been shown as it is well known in the art. An illustration of keyboard control of contacts may be found in Fig. 1 of United States Patent No. 1,320,908, to R. D. Parker. Accordingly when a key of the keyboard transmitter is operated to represent a character of the original message, the code combination representing such character will be set up on the switches K_1-K_5 . There is also provided in the circuit arrangement the tape transmitter A including the contacts A_1, A_2, A_3, A_4 and A_5 and the tape transmitter B including the contacts B_1, B_2, B_3, B_4 and B_5 . For purposes of simplifying the circuit the contacts of the tape transmitters are shown as insulated from each other rather than associated with the usual bus-bars. The contacts of the tape transmitters are controlled in a well-known manner by perforated key tapes, the perforations of which represent a set of arbitrarily chosen code combinations. There is furthermore provided a plurality of selecting magnets 1, 2, 3, 4 and 5. The operating circuits of these magnets are controlled over the contacts of the tape transmitters A and B and the keys K_1-K_5 in such a manner that the code combination set up on keys K_1-K_5 will be combined in effect with the code combinations of the two enciphered tapes in transmitters A and B and will be set up as a different and enciphered code combination on the magnets 1, 2, 3, 4 and 5. The operation of this circuit arrangement is substantially similar to the arrangement illustrated and described in the U. S. Patent No. 1,320,908, issued to R. D. Parker. Locking windings are provided for each of the selecting magnets and are completed over a common circuit and a contact of switch 7. The selecting magnets 1, 2, 3, 4 and 5 control a set of disc selectors, such as 10, in a manner more fully pointed out in the United States Patent No. 1,232,045, to C. L. and H. L. Krum. Switch 7 is controlled by the operation of selecting mechanism, as will be pointed out later, and

serves to operate the stepping magnets M_a and M_b which step the perforated key tapes ahead after each operation of the device. Battery for the operating circuits of the selecting magnets is provided over the contact of switch 6. Switch 6 is controlled by a universal bar associated with the keyboard transmitter heretofore referred to and is operated whenever any of the keys thereon are depressed. This switch is adjusted so that it will not operate until after the keyboard selecting mechanism shall have completed its operation.

The selecting mechanism is illustrated in Fig. 2 and controls the operation of the type-wheel 33. The type-wheel is mounted on a shaft 17. Associated with the frame 19 are the supporting members 16 and 18. The selecting mechanism comprises essentially a plurality of selector discs 10 and a drum 15 containing a plurality of stop pins, such as 11, 12, 13, and 14. Each of the selector discs is controlled by one of the selecting magnets 1, 2, 3, 4 and 5 of Fig. 1 and may be rotated slightly by the magnet. The selector discs have holes in them arranged so that for each combination of discs operated the holes will be lined up so that one of the stop pins may pass through all of the discs. Five selector discs have been illustrated and in practice the drum might contain thirty-two stop pins. While a selecting device of this arrangement is well-known in the art, it is pointed out that any other well-known selecting mechanism might equally well be utilized in this invention. After the enciphered code combination representing a character of the original message has been set up on the selector magnets 1, 2, 3, 4, 5 and the selector discs 10 have been operated thereby, the operator will depress an operating handle attached to the shaft 24. This will move a crank 25 attached thereto to the right and it will press against the drum and move it to the right. This will cause the selecting pins to be pressed against the selector discs and one of the pins will pass through the set of holes therein which are in alignment. Attached to a hollow shaft or sleeve 23, which is keyed to the type-wheel shaft so that it may slide along said shaft, is a striking arm 20. When the drum is moved to the right far enough so that one of the stop pins has been projected through the discs, the drum will press slightly against the sleeve 23, which projects through the selector discs, as shown, so as to be capable of contact with the drum. The sleeve 23 and the striking arm 20 are accordingly moved to the right so that the striking arm will clear the stop pin. When this occurs the type-wheel shaft will rotate until the striking arm is stopped by the projecting stop pin. This will cause the type-wheel itself to rotate until it has

placed the letter or character thereon, which represents the enciphered code combination, either opposite some stationary marker so that it may be read or into a position to be
 5 printed. The stationary marker has not been illustrated, but it may be in the form of a window or slot cut in a case surrounding the type-wheel, if desired. The spring 72 is provided for restoring the sleeve 23
 10 and striking arm 20 to its original position after the pressure of the drum against sleeve 23 has been removed.

If it is desired to print the characters directly from the type-wheel the mechanism
 15 illustrated in Fig. 7 is provided. This mechanism includes a printing magnet 36, the operating winding of which is connected by conductor 35 to an insulated spring 34 to the type-wheel shaft and the circuit is
 20 then completed through the striking arm 20 and the projecting stop pin which is grounded to the frame of the device. An insulating bushing 22 is provided to enable the circuit to be completed in this manner.
 25 Accordingly when the type-wheel is revolved and stopped at its desired position by the striking arm coming in contact with the projecting stop pin, this action will close a circuit for the printing magnet 36. The
 30 printing magnet 36 controls an angular shaped member 37 pivoted at point 38. Associated therewith is a tape 40 which is held on the rollers 39, 41, 42 and 46. The operation of member 37 by the printing magnet will raise the roller 39 and cause the
 35 tape to come into contact with the type-wheel 33 and the character thereon will be printed on the tape. Inking rollers 47 are associated with the type-wheel 33. Mounted
 40 on roller 41 is the ratchet mechanism 43 which is controlled by the pawls 44 and 45. Pawl 44 is operated by the member 37 when it is returned to normal by the spring 48 when the printing magnet is released. This
 45 action causes roller 41 to revolve and move to tape 40 along in preparation for the printing of the succeeding character of the message.

The type-wheel shaft is driven by a spring
 50 mechanism which is illustrated more fully in Figs. 3, 4 and 5, together with Fig. 2. Similar reference characters have been used to denote like parts in all of the figures. The spring mechanism is wound during the
 55 downward movement of the operating handle, heretofore referred to, which is illustrated in Fig. 3 as attached to shaft 24. This operating handle moves through an angle of about 30 degrees and rotates gear
 60 29 by means of the sector 26. Gear 29 is free to rotate on shaft 27 which is supported by the member 28. Attached to gear 29 is a pawl 55 which engages a ratchet wheel 50 which is attached to a sleeve 51 free to rotate
 65 on shaft 27. This sleeve 51 is attached to

the inner end of a clock spring, the outer end of which is attached to a case 30 by means of a pin 52. Rigidly attached to member 28 is a second pawl 73, which also engages the ratchet mechanism 50. Case 30 is rigidly
 70 attached to shaft 27. This clock spring drives the type-wheel shaft by means of the beveled gears 31 and 32. During the first part of the downward movement of the handle 56 the striking arm 20 is held against
 75 the stop 21, as has been pointed out, and the type wheel shaft 17 cannot rotate. Accordingly, the bevelled gears 32 and 31 will be held in position and as the casing 30 is rigidly affixed to the same shaft 27 as the
 80 gear 31 the casing 30 will also be held stationary. Then the rotation of gear 50 will wind up the clock spring. When the handle 56 has reached the bottom of its downward movement the striking arm 20 is released, as
 85 previously described. As has been pointed out, the pawl 73 is rigidly attached to member 28 and it will hold the gear 50 in place at this point. Accordingly, the clock spring will cause the casing 30 to rotate. This in
 90 turn, through the shaft 27 and bevelled gears 31 and 32, will cause the type wheel shaft 17 to rotate. It is noted that the handle 56 should be held depressed until the selecting mechanism has stopped operating, due to the
 95 striking arm 20 coming in contact with one of the stop bars. The gearing of the mechanism is arranged so that each time the operating handle is depressed the clock spring will be wound sufficiently to rotate the type-
 100 wheel shaft one complete revolution. In the detailed illustration of the above mechanism given in Figs. 4 and 5, Fig. 4 is a sectional view along the line 53, 54 of Fig. 5, in which is shown an end view of the
 105 mechanism.

In Fig. 3 there is shown mounted on shaft 24 an arrangement for controlling the switch 7 of Fig. 1. This arrangement consists of a
 110 lever and pawl 60, a ratchet mechanism 61, and a cam 62, an enlarged view of this arrangement being shown in Fig. 6. When the operating handle 56 is released the lever and pawl 60 which are attached thereto will cause the ratchet mechanism 61 and the cam
 115 wheel 62 to be rotated. The rotation of the cam mechanism will cause the switch 7 to open its right hand contact and temporarily close its left hand contact. Referring now to Fig. 1, it will be seen that this operation
 120 will cause the locking circuits of the selecting magnets, 1, 2, 3, 4 and 5 to be opened and the magnets released, thereby allowing the selecting magnets and selector discs to be restored to normal ready for the the next
 125 code combination of the message. When the left hand contact of switch 7 is closed a circuit is completed for the stepping magnets M_a and M_b which will operate to step the key tapes in the transmitters A and B
 130

ahead so as to present a new code combination to be combined with the succeeding code combination of the original message. Furthermore, when the operating handle is released the drum and handle will be returned to their original position by the springs 70 and 71. The striking arm 20 will then be released and the type-shaft will rotate until the striking arm hits the stop 21. Stops may also be provided for limiting the movement of the operating handle.

From the above description of the arrangements of the invention it will be seen that to encipher a message the operator will merely have to depress a key representing a character of the message. This character will then be automatically set up as a code combination on the switches K_1 — K_5 . This code combination will then be combined in effect with the code combinations of two key tapes and an enciphered code combination will be set up on the selecting magnets 1—5. The operating handle will then be depressed and the selecting mechanism, which is under the control of the selecting magnets, will operate the type-wheel to produce the character representing the enciphered code combination, which character may be copied down or printed as desired. To decipher a message, it is pointed out that the characters of the enciphered message should be set up on the keys and key tapes utilized which are identical with those utilized to encipher the message. Under such conditions the type-wheel will render the original message.

While the arrangements have been illustrated as adapted for use with a five unit code, it is pointed out that by eliminating one of the switches, such as K_5 , and one of magnets, such as 5, that they might be utilized with a four-unit code, or other codes. Furthermore while certain selecting mechanisms have been illustrated, the arrangement is operative with other well known types of selecting mechanisms. Accordingly while the invention has been disclosed as embodied in certain specific arrangements, which are deemed advisable, it is pointed out that they are capable of embodiment in many and widely varied forms without departing from the spirit of the invention as defined by the appended claims.

What is claimed is:

1. In a ciphering device in which a code combination of the original message is combined in effect with a code combination of a key tape and the result produced as an enciphered code combination set up on a plurality of selecting members, selecting mechanism controlled by said selecting members, a manually actuated operating member for directly actuating said selecting mechanism, and a character indicating device controlled by the actuation of said selecting mechanism

for giving a character indication of the enciphered code combination set up on said selecting members.

2. In a ciphering device in which a code combination of the original message is combined in effect with a code combination of a key tape and the result produced as an enciphered code combination set up on a plurality of selecting members, selecting mechanism controlled by said selecting members, a manually actuated operating member for directly actuating said selecting mechanism, a type-wheel controlled by the actuation of said selecting mechanism for giving a character indication of the enciphered code combination set up on said selecting members, spring mechanism for operating said type-wheel, and means controlled by said operating member for winding said spring mechanism.

3. In a ciphering device in which a code combination of the original message is combined in effect with a code combination of a key tape and the result produced as an enciphered code combination set up on a plurality of selecting members, selecting mechanism and a type-wheel controlled thereby, a manually actuated operating member for directly actuating said selecting mechanism, said selecting mechanism being so controlled by said selecting members and said operating member that said type-wheel will give a character indication of the enciphered code combination set up on said selecting members, and a recording device associated with said type-wheel and selecting mechanism for recording in printed form the character indicated by said type-wheel when operated.

4. In a ciphering device, a circuit arrangement whereby a code combination of the original message is combined in effect with a code combination of a key tape and the result produced as an enciphered code combination set up on a plurality of selecting members, selecting mechanism controlled by said selecting members, a manually actuated operating member for actuating said selecting mechanism, a type-wheel controlled by the actuating of said selecting mechanism for giving a character indication of the enciphered code combination set up on said selecting members, spring mechanism for operating said type-wheel, means controlled by said operating member for winding said spring mechanism, means controlled by the releasing of said operating member for restoring said circuit arrangement to normal, and means controlled by the releasing of said operating member for changing the code combination of said key tape.

In testimony whereof, I have signed my name to this specification this 24th day of May, 1920.

RALZEMOND D. PARKER.