June 4, 1946. H. P. CLAUSEN 2,401,462

APPARATUS FOR DETERMINING THE PROFICIENCY OF CODE STUDENTS

Filed April 20, 1944 4 Sheets-Sheet 1

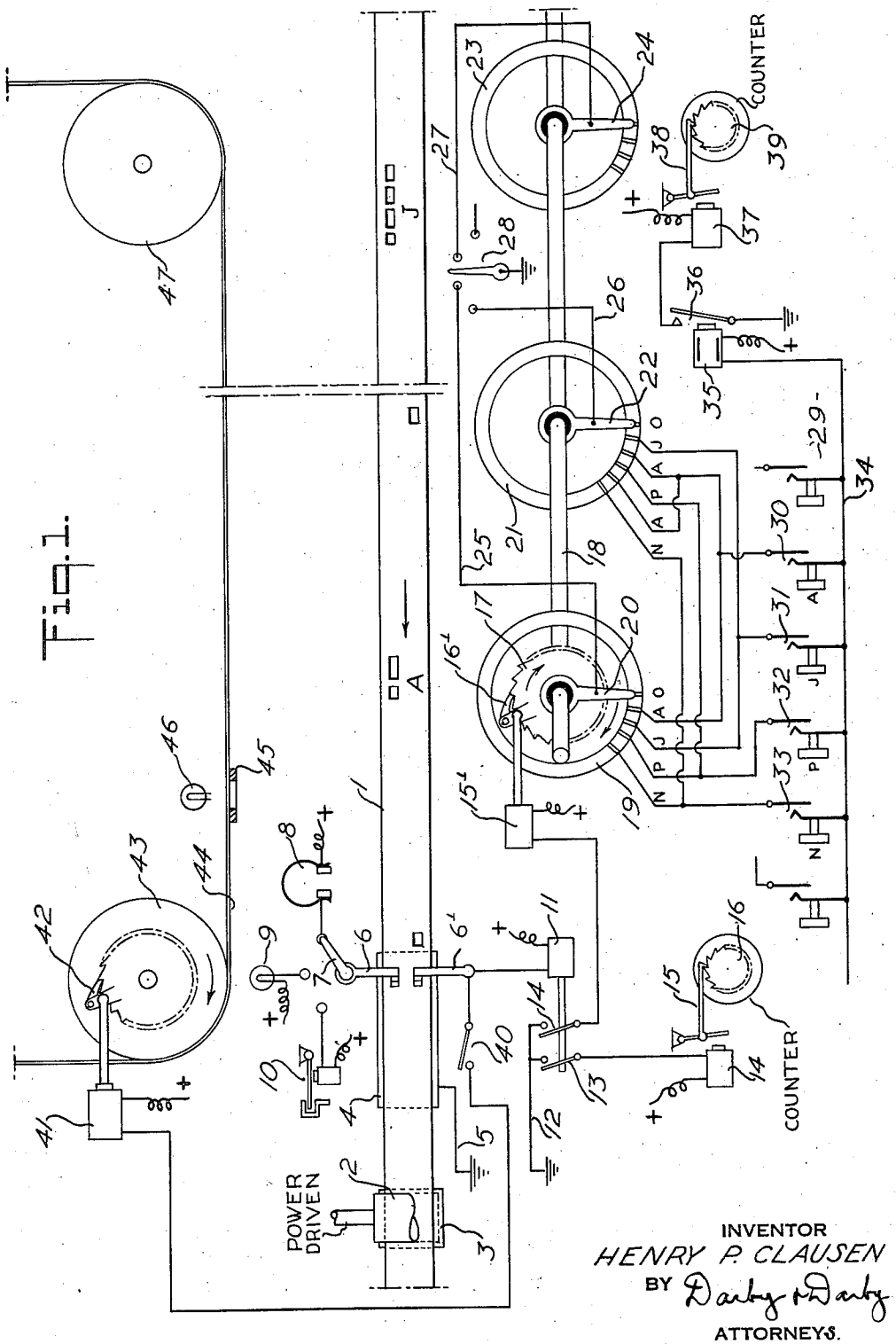


Fig. 1.

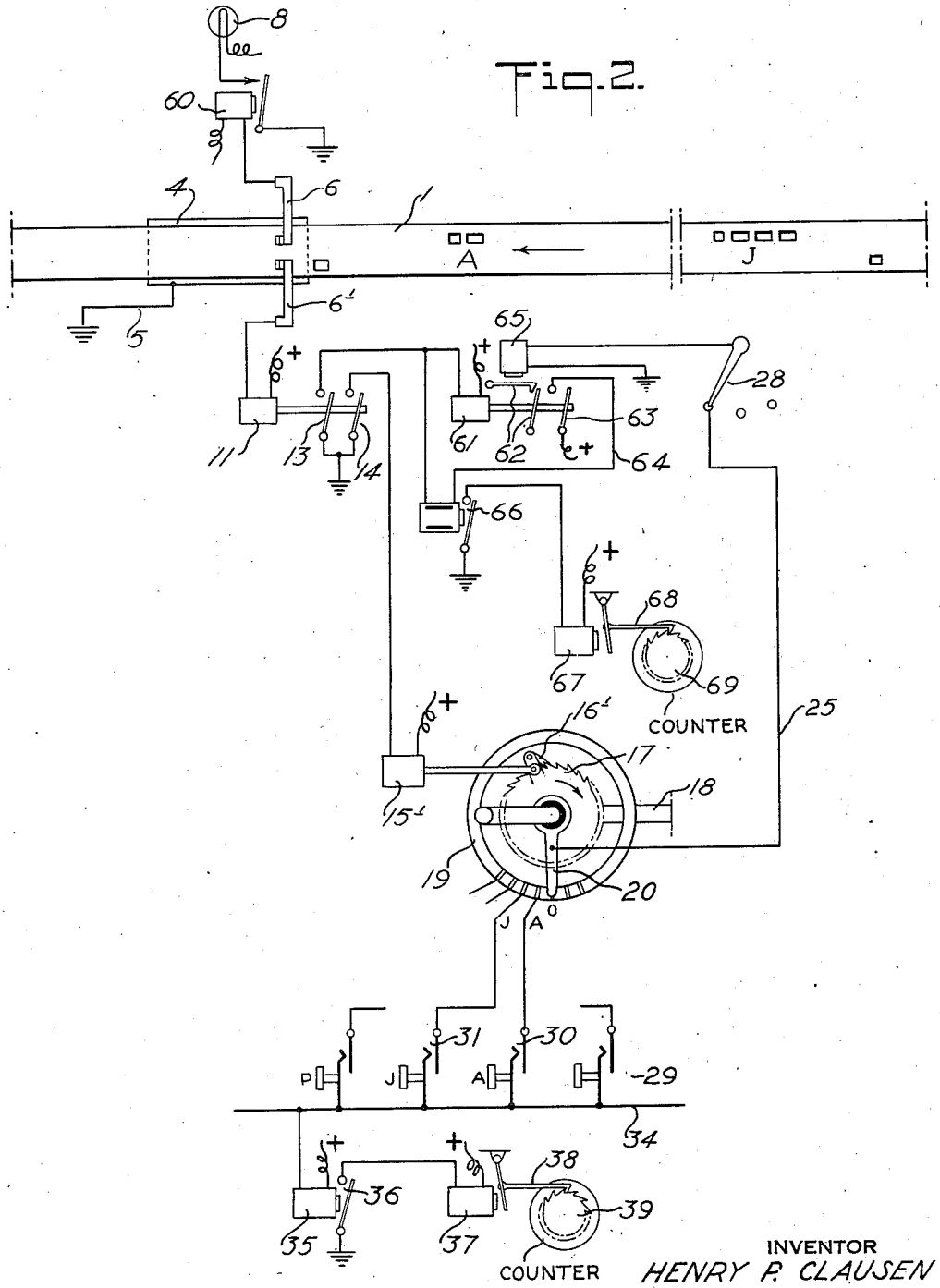
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Fig. 2.



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Filed April 20, 1944 4 Sheets-Sheet 3

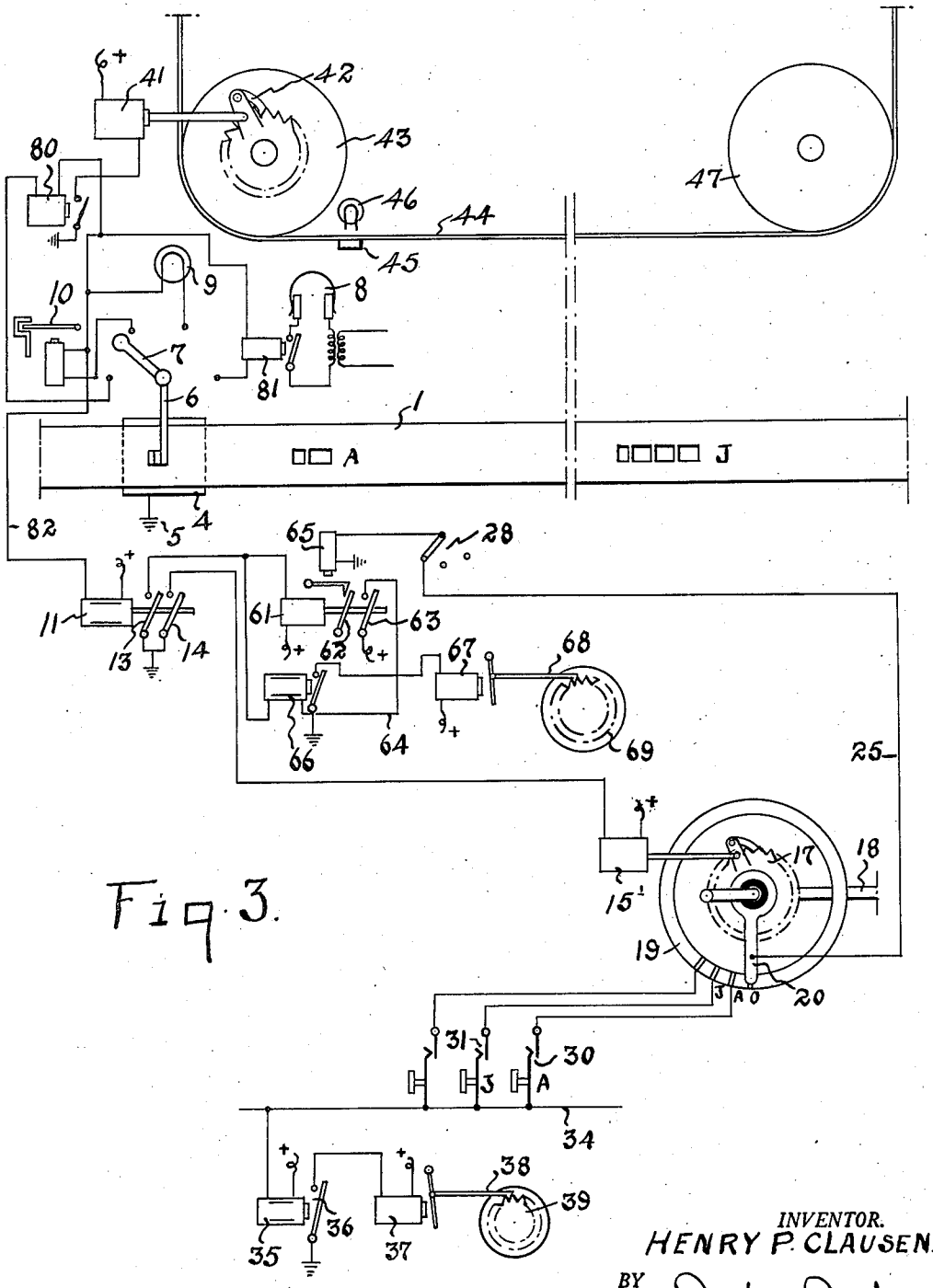


Fig. 3.

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Filed April 20, 1944 4 Sheets-Sheet 4

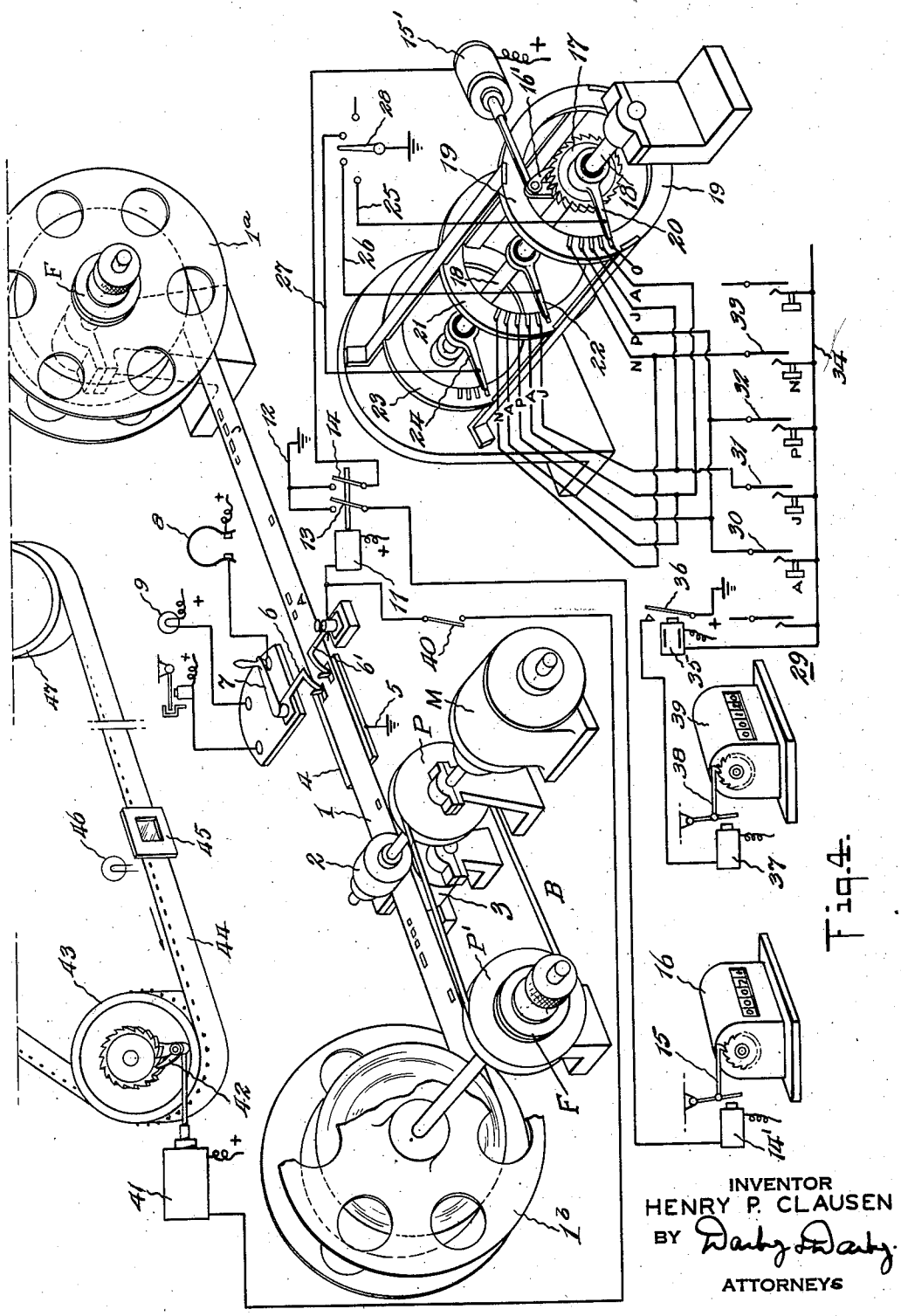


Fig. 4.

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UNITED STATES PATENT OFFICE

2,401,462

APPARATUS FOR DETERMINING THE PROFICIENCY OF CODE STUDENTS

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Application April 20, 1944, Serial No. 531,883

29 Claims. (Cl. 35—14)

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This invention relates to an apparatus and system by means of which students of the various communication codes, semaphore-signal systems, and the like, may be rated at various speed stages during their courses of instruction.

The general object of this invention is to provide a much simplified system as distinguished from other systems now in use, by means of which all the desirable functions of apparatus of this type may be reliably carried out.

Other and more detailed objects of the invention will be apparent from the following disclosure of several embodiments thereof as explained in detail below in connection with the attached drawings.

This invention resides substantially in the combination, construction, arrangement and relative location of parts, all as will be described in detail below.

In the accompanying drawings,

Figure 1 is a diagrammatic and schematic layout of one form of system in accordance with this invention;

Figure 2 is a similar view of a modified arrangement somewhat fragmentary, likewise embodying the principles of this invention; and

Figure 3 is a similar view of another form of the invention.

Figure 4 is a perspective view of the apparatus shown in Figure 1.

Some student code proficiency rating systems now in use are complicated and are particularly expensive to build, install and maintain. Because of these facts this present simplified system was devised to provide an arrangement having all the necessary attributes of such a system while adhering to principles of simplicity in construction with consequent reduction in the cost of manufacture, installation and maintenance.

The structural and circuit combinations of this invention will be described first in detail followed by an explanation of the operation of the system with emphasis on the important features thereof. The apparatus of the combination is controlled by means of a perforated tape 1, made of any suitable material and fed from a supply reel 1a along a defined path of travel by means of a pair of friction wheels 2 and 3 engaging the tape on opposite faces thereof in driving relation. A friction slip clutch F of any suitable known construction prevents the supply reel 1a from overrunning. One of these friction wheels, that is the wheel 2, as illustrated, is adapted to be connected to a suitable source of power such as an electric motor M so that the tape 1 may

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be moved in the direction of its length at a constant speed. The tape is supplied to a suitable take-up reel 1b after passing through the mechanism, but it first passes across the top of a table or conductive plate 4, which is grounded as indicated at 5, and which cooperates with a pair of fixed contact fingers 6 and 6' supported so as to engage the upper exposed face of the tape, as illustrated. The take-up reel is driven from the motor M by means of pulleys P and P' and belt B. Another friction clutch F permits driving pulley 1b at the proper speed to keep the tape 1 in proper tension. The tape has two rows of perforations, the uppermost of which represents the various standard code symbols as well as the letters of the alphabet, and the digits. For example, there is illustrated the code symbol of one dot and one dash for the letter A, and of one dot and three dashes for the letter J, in accordance with one standard code. The lowermost row of perforations consists of single, spaced openings as shown, positioned on the tape alternatively with associated code signals. This lower row of perforations comprises a control record as distinguished from the code record in the other row.

The fixed contact 6 is connected to a switch arm 7 positionable to any one of several contacts which are respectively connected to the headphones or sound reproducing device 8, the blinker light 9, and the standard telegraph sounder 10, all as diagrammatically illustrated. The other leg of the circuit of each of these devices is connected as indicated to a suitable grounded source of energy. For example, the headphones 8 may be connected in a buzzer circuit in a well known manner, and the lamp 9 and sounder 10 to suitable grounded sources of current for the operation thereof.

The contact finger 6' is directly connected to an electromagnet 11, the other terminal of which is connected to a suitable grounded current source. At this point it may be noted that in order to keep the drawings simple the return circuits for the various devices are not shown, as are not the various grounded current sources required to operate the apparatus. The completion of these circuits will be obvious to those skilled in the art. The electro-magnet 11 is the operator of a relay comprising a pair of switch blades 13 and 14, cooperating with a pair of fixed contacts, which are grounded at 12, as indicated. Switch 13 is connected to an electromagnet 14' comprising the operator for the counter device 15, of any suitable type, actuated through the pawl

and ratchet 15, as illustrated, so that upon each energization for the magnet 14 the counter will accumulate one additional digit. Switch blade 14 is connected to an electromagnet 15' and comprises the operator for a pawl 16' which cooperates with the ratchet wheel 17 mounted on the rotatable shaft 18 of a multiple switch structure. Mounted on the shaft 18 at spaced intervals are the contact arms 20, 22 and 24 which are insulated therefrom as shown, and all of which are attached to the shaft in radial alignment. The contact arms 20, 22 and 24 cooperate respectively with supports 19, 21 and 23 upon which are mounted, as illustrated, a plurality of contacts. The supports 19, 21 and 23 are held in fixed relation with respect to the shaft 18 and each positioned so that the contacts thereof may be respectively engaged by the contact fingers 20, 22 and 24. Switches of this type are well known in the art in many forms. As will be explained later, the number of switch units of this type which are provided will depend upon the number of test lessons for which it is desired to adapt a particular machine.

Switch arms 20, 22 and 24 are connected respectively by wires 25, 26 and 27 to the fixed contacts of a switch blade 28 which is grounded as shown.

At 29 is diagrammatically illustrated a keyboard which comprises a plurality of marked finger buttons, similar to a typewriter, which individually control switches, and which are arranged in a standard bank in accordance with any one of several known code systems. Such control boards are well known in the art in various forms, and therefore a diagrammatic illustration is adequate. The usual control board of this type is built to simulate a typewriter keyboard in which there is a key for each digit, a key for each letter of the alphabet, and a key for each of the various commonly used punctuation marks. Such keyboards only differ from standard typewriters in the relative arrangement of the various symbols depending upon the designer's belief as to the best relative positioning thereof. Such arrangements are commonly used for radio transmission of code, printing telegraph systems, Teletype systems, and the like.

At this point reference is again made to the tape 1, which as illustrated, may be termed the character tape in that its upper row of perforations comprises indiscriminate combinations of letters, numbers, punctuation marks, and the other usual symbols employed in the exchange of intelligence. Thus the switch 19—20 may be termed the character switch. As will be explained in a moment, switch 21—22 can be termed the word or message switch, which when in use will employ another tape similar to the tape 1 but differently perforated in accordance with selected words of messages. Finally, in accordance with the illustration, the switch 23—24 may be called the semaphore switch since, as will be explained, it is used with the semaphore portion of the apparatus, and employs a special tape having only the lower row of control perforations, although it can employ any of the other tapes used in the machine, in which case only the control row of perforations will be employed, as will also be explained. If a particular machine is intended for use with five different tapes there will be five control switches operated by the shaft 18, and for further example, if it is designed to use ten tapes there will be ten of these switches. Thus, as will be explained, these switches will be

wired for a particular set of tapes, and will require rewiring for a different set of tapes. However, since switches of this type are compact, a relatively large number of them can be operated by a single shaft 18, and hence the entire machine can be adapted for rating a wide range of lessons.

Returning now to switch 19—20 it will be seen that the first position thereof, as illustrated, is the zero position, and it is to be noted that all the other switch blades, of which the blades 22 and 24 are representative, are in the same position and out of circuit. The first contact of switch 19—20 is connected by a wire, as shown, to the switch 30 in the keyboard, and to a contact in the switch 21—22. As illustrated, these two contacts correspond to the letter A, and wherever the letter A again appears, in any one of these switches and in additional switches in the set, they will all be wired together and to the switch 30. This principle is illustrated with respect to switch 21—22 where the letter A occurs twice, and hence they are connected together and to switch 30. The key which controls switch 30 is indicated by the letter A, which will appear on its face just as in a typewriter keyboard so that the student knows that this is the key for the letter A.

The letter J, as illustrated, is represented by the next contact of switch 19—20 and is connected to switch 31 operated by the J key of the control board. The switch 21—22 is shown wired up for the word "Japan" and so we find that the J contact of this switch is also connected to switch 31. In a similar way the switches 32 and 33 are connected to the P and N contacts. The common lead 34 for all of these switches is connected to the electromagnet 35, forming the operator of a relay which includes the switch 36. One contact of this switch is grounded and the other connects to an electromagnet 37, which is the operator for the pawl 38 which actuates a counter device 39 like the counter 16.

The semaphore portion of the equipment includes a circuit through the switch 40, arm contact 6' to an electromagnet 41, which is the operator for the pawl and ratchet 42 of a feed wheel 43 for the semaphore tape 44. This tape can, for example, be in the form of a photographic film having a succession of images thereon representing the various flag positions of a semaphore code, and these images may be arranged as indiscriminate characters, or so as to form the words of a message. The film ribbon 44 is passed along a defined path by a pair of guide rollers 43 and 47 from a supply reel, not shown, to a take-up reel, not shown. This equipment will normally be used so that the image areas can be exposed in succession through a window 45 which may be illuminated by a lamp 46, as illustrated. This portion of the device will preferably be placed so that a student sitting in front of it can view the window which, if desired, may be provided with a magnifying lens, not shown, or the picture may be projected upon a screen for enlarging purposes, when desirable.

The operation of this system will now be set forth in detail. With the drive roller 2 in operation the tape 1 will move from left to right at a constant speed. For beginning students the tape will have its perforations well spaced, but for more advanced students they will be spaced more closely together. For all classes of students it is important to note that the tape will move at the same constant speed. The perforations in

the tape can therefore always be of the same length and spacing for any letter, figure or symbol but the spacing between them will depend upon the proficiency of the student being rated, i. e. the faster the translating ability of the student the closer will be the spacing between the perforations for each letter, figure and symbol. The interposed control perforations comprising the lower row will be similarly varied in spacing to meet the various speed requirements.

With the tape in motion with respect to any letter or character the corresponding control perforation will first reach the switch 6' permitting it to engage the contact table to complete a circuit from ground at 5 through the table 4, contact 6' and magnet 11 back to the current source. Switches 13 and 14 will close, the former completing a circuit from ground to 12 through switch 13, to magnet 14' and back to the current source, causing the counter 16 to operate an indicator showing one actuation. Switch 14 upon closing completes a circuit from ground at 12 through switch 14 and magnet 15' back to the current source to operate the ratchet wheel 17 by means of the pawl 16' so that shaft 18 is moved one step in a clockwise direction. Switch arm 20 will move from this zero position as indicated to the next contact, and likewise switch arms 22 and 24 will move one step in a clockwise direction. Switch 28 will have been moved previously to complete a circuit from ground through it to wire 25, so that switch arm 20 prepares a circuit at contact A to switch 30. Since the tape 1 is the character tape, switch 28 must be positioned to include the character switch 19—20 in circuit. All these operations have occurred without any effect on the student. However, when the trailing code signal, that is the letter A in this case represented by perforations in the tape, reaches the contact 6, a circuit will be completed from ground at 5 through table 4, contact 6, switch 7, and headphones 8 back to its energizing source. This is on the assumption that the student is to get his test on the basis of sound corresponding, for example, to a continuous wave signal. If his test is to be on a visual basis, switch 7 will be in a position to place the blinker light 9 in circuit, and if his test is to be on the basis of the usual telegraph instrument, switch 7 will be moved to place it in circuit.

When the student hears the dot and dash signal in his earphones, it is his duty under the test to determine what letter that signal represents, and to operate the character switch of the control board 29 within the predetermined period of time which it takes the tape to move from the A perforations to the next control perforation. If the student correctly recognizes this signal within the allotted time period, he strikes the A key of the control board, closing switch 30 so that the circuit previously prepared up to that switch is completed by the wire 34 and magnet 35 back to the current source. This closes switch 36, energizing magnet 37 and operating the counter 39 through the pawl 38. Upon examination of the circuits controlled by the other switches in the control board it will be seen that if he strikes the wrong key no circuit to the magnet 35 will be completed. On the other hand, if he strikes the right key but does not do so until after the next control perforation has reached the contact 6', magnet 35 will likewise not be operated. This is true because when the next control perforation reaches the contact 6' magnet 15' will be energized as before to operate shaft 18, so that switch blade 20 will have moved to the next contact. Thus if switch 30 is closed after this movement of switch 20, the student cannot complete a circuit to magnet 35 and hence the counter 39 is not operated. These operations continue as the test progresses, and it will be seen that everytime a control perforation reaches contact 6' the counter 16 will accumulate one more digit, so that at the end of the test it will indicate the total number of characters for which the student was tested. On the other hand, the counter 39 will have accumulated a number representing all of the correct responses of the student. Thus the two counters give a direct ratio of the accuracy of the student's responses during the test.

The operation of the system employing a tape having signal perforations representative of words, complete sentences or complete messages, will be the same. It is noted, however, that the tape will be different in that the code perforations instead of being indiscriminate will be arranged in accordance with the words, sentences and messages comprising the test. Thus if a tape is employed having perforations representative of the word "Japan" it will be seen that switch 21—22 will be successively operated to establish circuits to the control board 29 corresponding to the letters of the word "Japan" and the student, if proficient, can operate the switches of the control board in the proper sequence. The indications of the two counters will however be the same as that previously described. Of course, in using the number switch 21—22, switch 28 will be in the position to engage the contact to which wire 26 is connected.

If a semaphore test is to be made switch 28 will be connected to wire 27 and the contacts on the support 23 will be respectively wired to the switches of the control board 29 so as to correspond to the sequence of semaphore images on the film 44. In this case the tape 1 need only be a control tape and hence will only have the lower row of particular perforations. Of course, any of the available tapes 1 can be used, corresponding to the speed proficiency of the student. In this case switch 40 will be closed and the film 44 will be threaded around the guide wheels 43 and 47 and positioned so that the first image is just to the right of the window 45. When the first control perforation reaches contact finger 6' a circuit will be completed from ground at 5 through the table 4, contact 6', switch 40, magnet 41 and back to the current source. The pawl and ratchet 42 will then operate the guide and feed wheel 43, one step to pull the first image of the film 44 into the window 45 where it will be illuminated by the energized lamp 46. The student translates the semaphore signal into his understanding of what letter, number or character the semaphore signal represents, and he then presses the proper switch in the control board 29. If we assume that the first semaphore signal is for the letter A, and that the first contact of switch 23—24 is, as it must be, wired to switch 30, the student will upon closing the switch, if he does so before the next control perforation arrives at contact 6', operate counter 39 as before. If he strikes the wrong key or strikes it too late no record will be made on the counter 39. Of course, at the time magnet 41 was energized counter 16 was operated as before. As each control perforation arrives at the contact 6', switch blade 24 will advance step

by step to succeeding contacts which will, as stated, be wired to correspond to the particular film 44 being displayed so that the test, as explained, can be made. It will be understood that the film 44 is advanced step by step a distance which each time represents one image area or film frame. It is, of course, apparent that the semaphore signals may be arranged in words, sentences and the like, and with additional switches like the switch 23—24 properly wired to the control board the student can be tested for these messages.

A slightly different principle of operation has been illustrated in Figure 2 as applied to the tape 1, which can be equally well applied to the semaphore type of testing apparatus. Here, as before, the tape 1 is illustrated as comprising a lesson of indiscriminate letters, numerals and characters, but it could equally well be perforated for words, sentences and the like. In this case the contact 6 is shown operating a relay 60 for in turn operating the blinker light 9, but, of course, other signaling devices could be used as previously explained, as for example a loud speaker or a sounder. The contact 6' as before is connected to the magnet 11 which operates the grounded switch blades 13 and 14. Switch blade 13 controls a circuit for the electromagnet 61 which is part of a relay including the switch 63. The magnet 61 also operates a latching arrangement 62, or in other words, this device is a latching relay which stays operated until released. One lead of slow acting relay 66 is grounded and its circuit is completed to the current source through switch 63 when closed. Relay 66 controls the circuit for an electromagnet 67 which operates a counter 69 by means of the pawl 68. This counter is of the same type as those previously described. Switch 14 controls a circuit for magnet 15' as before, which operates the shaft 18 through the ratchet 17 and the pawl 16'. Shaft 18, as before, will be provided with a number of switches, depending upon the scope of lessons or tests for which the machine is adapted. Only the switch 19—20 has been illustrated for the sake of simplicity. Assuming that the tape 1 is like that of Figure 1, it will be seen that switch 19—20 is wired through the control board 29 as before, and controls a relay 35—36 which in turn operates the electromagnetic operator 37—38 to operate the counter 39. Relay 35 is preferably slow to drop off so the counter 39 has time to operate. Counter 39 is like those previously described. In this arrangement the contact arm 20 is connected by wire 25 to the switch 28 as before, but in this case this switch in turn is connected to the unlatching magnet 65 of the latching relay.

A brief description of the operation of this system will be given. The tape 1 will be driven as before, and when the first control perforation reaches the contact 6' a circuit will be completed from ground at 5 through the table 4, and contact 6' to magnet 11. Switches 13 and 14 will be closed. The closing of switch 14 will move shaft 18 from its zero position in a clockwise direction to the first or A contact as illustrated. The closing of switch 13 will complete a circuit to the magnet 61 to cause switch 63 to close and the latch 62 to latch up and hold it closed. Although the closing of switch 13 also completed a circuit to relay 66 through switch 63, the former being slow acting, the circuit controlled by it was not completed before switch 13 opened. Thus the counter 69 is not operated at this time. When the corresponding signal perforations, as for example those for the letter A, reach the contact 6, the blinker light is correspondingly operated and the student then has until the next control perforation reaches the contact 6' to operate the proper key. If he operates the proper key, that is the A key in this case, he will complete a circuit from the current source through magnet 35, switch 30, switch blade 20, wire 25, switch 28 and magnet 65 to ground. The energization of magnet 35 will close switch 36 to operate magnet 37, and hence the counter through the pawl 38. The energization of magnet 65 will release the latch 62 so that switch 63 opens. On the other hand, if the student actuates the wrong key or operates the right key too late, the counter 39 will not be actuated and latch 62 will not be released, so that switch 63 remains closed. Therefore, when the next control perforation reaches contact 6' magnet 11 will be actuated. This will cause switch 13 to close and since switch 63 is already closed, slow acting magnet 66 will have time enough to operate before the circuit is broken at contact 6', so that magnet 67 is energized and counter 69 is operated through the pawl 68. This counter will therefore register the mistake which the student previously made, i. e. a mistake for a particular signal is not registered until the following control perforation reaches the contact 6'. Thus, at the end of the test this system will provide a total of correct responses on the counter 39 and a total of incorrect responses on the counter 69, providing a percentage ratio of accuracy of the student. Of course, the sum of the totals of the two counters will give the instructor the total number of characters or signals upon which the student has been tested.

Upon consideration it will be seen that the switches on shaft 18 can be multiplied as before for additional tapes, and that the semaphore arrangement can be included, if desired. The tapes will be driven at a constant speed, as before, prepared for various speeds of signal reproduction, depending upon the proficiency of the student. Indeed, the arrangement of Figure 2 only differs from that of Figure 1 in providing a different circuit arrangement, and in giving a direct record of actual mistakes as distinguished from an indirect record as produced by the system of Figure 1.

It was not intended to indicate by a statement made earlier in this disclosure that for a machine employing say five switches 19—20, only five tests could be given, because for a particular switch and its wiring it is apparent that a number of tapes providing different tests could be used for that switch. These tapes not only have the same code symbols in the same sequence, but could be varied so that a range of speed tests could be made. Thus, as a matter of fact, with any particular set of switches a corresponding number of tests or any desired number of multiples thereof could be made.

The system illustrated in Figure 3 may possibly be considered to be the most practical and useful because it employs a tape which does not have a separate row of control perforations, but rather is dependent in its operation upon the code perforations which also act to control the apparatus. The system illustrated in Figure 3 includes a semaphore element as well as the other elements, but it will be apparent that the feature of this invention, as in the other forms of the invention, may be applied to either alone. The main structural difference in the system of Figure 3 over that of the other systems resulting from

the use of a single row of perforations is found in the manner of operating the relay 11. In this arrangement, as distinguished from that of Figure 1 for example, the switch 7 is provided with an extra contact which controls a relay 80, controlling in turn the electro-magnetic operator 41 for the semaphore feed. There is also the minor change that instead of connecting the loud speaker 8 directly to the switch 7 it is controlled by a relay 81 connected thereto. One terminal of the relay 81, the blinker light 9, the sounder 10, relay 80 and relay 11 have a common connection, as shown. The other terminals of the loud speaker 8, blinker light 9 and sounder 10 are connected to contacts in the switch 7, as before. The other terminal of relay 80 is connected to an additional contact in this switch, as shown. The other portions of the circuit are the same as disclosed in Figure 2, and the only other points to be noted are that relay 11 is preferably of a type which is slow to drop off, relay 35 is slow to drop off or release, and relay 66 is preferably very slow to respond. The most important relay in this respect is relay 11.

In the operation of the system it is first to be noted that the type of signal to be reproduced is determined by the position of the blade of switch 7, as will be apparent from the figure. However, regardless of the position in which the switch blade is, relay 11 will be operated each time a signal perforation reaches switch 6, at which time, of course, the particular type of signal device connected by the switch 7 will be simultaneously operated. To put it another way, at each time that one of the signal devices is operated, depending upon the position of switch 7, relay 11 will also be operated. Thus the signal perforations in this system also actuate the relay 11 as distinguished from the other systems where a separate row of control holes is employed. The relay 11 is preferably slow to drop off, so that it will not be caused to chatter as the successive perforations of a control signal pass the contact finger 6. The system otherwise operates as before and it is not believed that it is necessary to go through it again in detail. It is to be noted that the principle of this form of the invention may be equally well applied to the system of Figure 1, wherein the contact finger 6' will be eliminated and the relay 11 connected to spring finger 6, in which case the signal perforations will also control the relay.

From the above description it will be apparent to those skilled in the art that the principles and subject matter of this invention can be embodied in a number of different physical forms. I do not, therefore, desire to be limited to the embodiment herein disclosed in an illustrative sense, but rather by the scope of the claims granted me.

What is claimed is:

1. In a system for determining the accuracy of code signal interpretation, the combination comprising means for reproducing code signals in a predetermined sequence, a counting device, means controlled by said reproducing means for preparing said counting device for operation, means manually actuated as an interpretative expression of said signals for operating said prepared counting device, and means for rendering said manual means ineffective a predetermined period of time after the reproduction of each signal.

2. In the combination of claim 1, said reproducing means including a perforated tape.

3. In the combination of claim 1, said reproducing means including a perforated tape having a row of signal perforations and a row of control perforations.

4. In a system for determining the accuracy of code signal interpretation, the combination comprising means for reproducing code signals in a predetermined sequence, a registering device, means controlled by said reproducing means for preparing said registering device for operation, means manually actuated as an interpretive expression of said signals for operating said prepared registering device, and means controlled by said reproducing means for rendering said manual means ineffective a predetermined period of time after the reproduction of each signal.

5. In the combination of claim 4, said reproducing means including a perforated tape.

6. In the combination of claim 4, said reproducing means including a perforated tape having a row of signal perforations and a row of control perforations.

7. In a system for determining the accuracy of code signal interpretation, the combination comprising means for reproducing code signals in a predetermined sequence, a registering device, a plurality of means individually operable as an interpretive expression of said signals for operating said registering device, and means controlled by said reproducing means for sequentially preparing said plurality of manually operable means for operation of said registering device whereby only the manually operable means corresponding to a particular reproduced signal will operate said reproducing device.

8. In the combination of claim 7, said reproducing means including a perforated tape.

9. In the combination of claim 7, said reproducing means including a perforated tape having a row of signal perforations and a row of control perforations.

10. In a system for determining the accuracy of code signal interpretation, the combination comprising means for reproducing code signals in a predetermined sequence, a registering device, a plurality of means individually operable as an interpretive expression of said signals for operating said registering device, means controlled by said reproducing means for sequentially preparing said plurality of manually operable means for operation of said registering device whereby only the manually operable means corresponding to a particular reproduced signal will operate said reproducing device, and means for rendering said manually operable means ineffective to operate said registering device a predetermined period of time after the reproduction of each signal.

11. In the combination of claim 10, said reproducing means including a perforated tape.

12. In the combination of claim 10, said reproducing means including a perforated tape having a row of signal perforations and a row of control perforations.

13. In a system for determining the accuracy of code signal interpretation, the combination comprising means for reproducing code signals in a predetermined sequence, a registering device, a plurality of means individually operable as an interpretive expression of said signals for operating said registering device, means controlled by said reproducing means for sequentially preparing said plurality of manually operable means for operation of said registering device whereby only the manually operable means corresponding to a particular reproduced signal will operate said reproducing device, and means also controlled by

said reproducing means for rendering said manually operable means ineffective to operate said registering device a predetermined period of time after the reproduction of each signal.

14. In the combination of claim 13, said reproducing means including a perforated tape.

15. In the combination of claim 13, said reproducing means including a perforated tape having a row of signal perforations and a row of control perforations.

16. In a system for determining the accuracy of code signal interpretation, the combination comprising means for reproducing code signals in a predetermined sequence, a registering device, means controlled by said reproducing means for preparing said registering device for operation, means manually actuated as an independent expression of said signals for operating said prepared registering device, means for rendering said manual means ineffective a predetermined period of time after the reproduction of each signal, a second registering device, and means controlled by said reproducing means and said manual means for operating said second registering device in the event that an actuated manual means does not correctly interpret the signal.

17. In the combination of claim 16, said reproducing means including a perforated tape.

18. In the combination of claim 16, said reproducing means including a perforated tape having a row of signal perforations and a row of control perforations.

19. In a system for determining the accuracy of code signal interpretation, the combination comprising means for reproducing code signals in a predetermined sequence, a registering device, a plurality of means individually operable as an interpretive expression of said signals for operating said registering device, means controlled by said reproducing means for sequentially preparing said plurality of manually operable means for operation of said registering device whereby only the manually operable means corresponding to a particular reproduced signal will operate said reproducing device, a second registering device, and means controlled conjointly by said reproducing means and said plurality of manually

operable means for operating said second registering device upon each misinterpretation of the reproduced signals.

20. In the combination of claim 19, said reproducing means including a perforated tape.

21. In the combination of claim 19, said reproducing means including a perforated tape having a row of signal perforations and a row of control perforations.

22. In the combination of claim 1, a second registering device, and means controlled by said signal reproducing means for actuating the registering device once for each signal reproduced.

23. In the combination of claim 4, a second registering device, and means controlled by said signal reproducing means for actuating the registering device once for each signal reproduced.

24. In the combination of claim 7, a second registering device, and means controlled by said signal reproducing means for actuating the registering device once for each signal reproduced.

25. In the combination of claim 10, a second registering device, and means controlled by said signal reproducing means for actuating the registering device once for each signal reproduced.

26. In the combination of claim 13, a second registering device, and means controlled by said signal reproducing means for actuating the registering device once for each signal reproduced.

27. In a system for determining the accuracy of code signal interpretation, the combination including a registering device, means for preparing said registering device for operation, means for reproducing code signals in predetermined sequence, said last means actuating the means for operating the registering device, means manually actuated as an interpretive expression of said signals for operating said prepared registering device, and means for rendering said manual means ineffective a predetermined period of time after the reproduction of each signal.

28. In the combination of claim 27, said means for reproducing code signals including a perforated tape.

29. In the combination of claim 27, said means for reproducing code signals including a perforated tape having code signal perforations only.

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