Nov. 12, 1940. W. D. TEAGUE ET AL 2,221,063

INDICATION FOR CASH REGISTERS AND ACCOUNTING MACHINES

Filed Feb. 17, 1938 2 Sheets-Sheet 1

FIG. 2

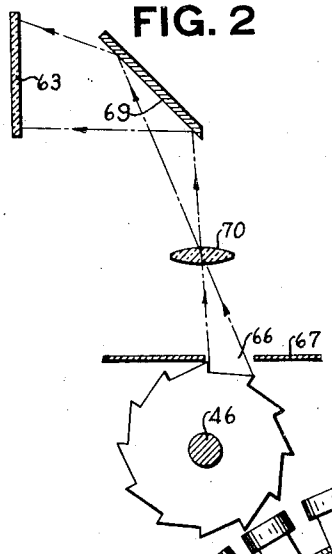


FIG. 1

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FIG. 3

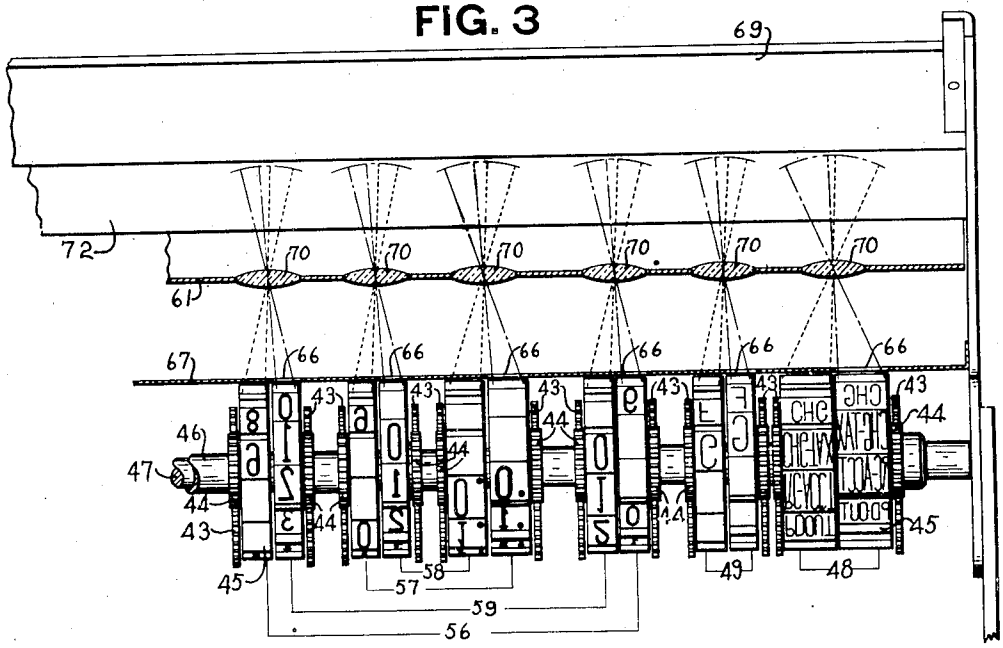


FIG. 4

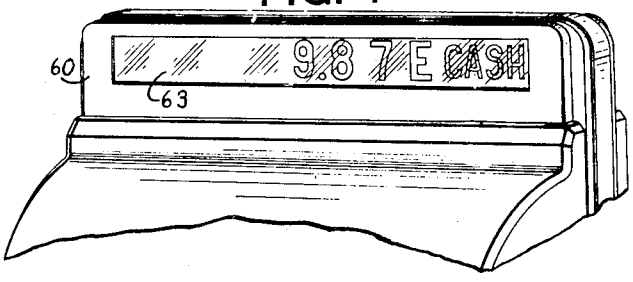


FIG. 6

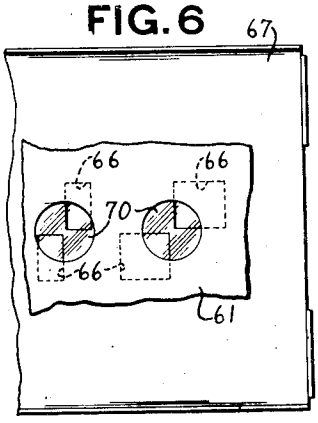
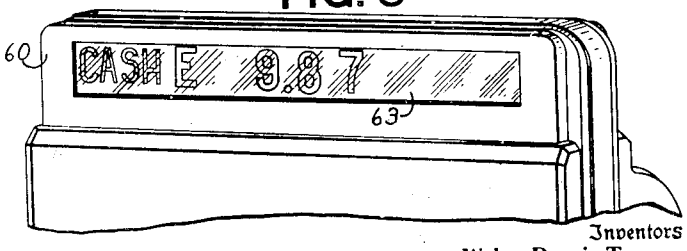


FIG. 5



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UNITED STATES PATENT OFFICE

2,221,063

INDICATION FOR CASH REGISTERS AND ACCOUNTING MACHINES

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Application February 17, 1938, Serial No. 190,910

2 Claims. (Cl. 88—24)

This invention relates to cash registers and like machines and more particularly to the means by which transactions are visually indicated.

The principal object of the invention is to provide means for projecting images of symbols, representing transactions, onto screens, by means of light, so that they are simultaneously visually apparent from the front and rear of the machine.

Another object of the invention is to provide an optical system whereby data present inside a cabinet may be rendered visible from the outside on translucent screens in the front and rear walls of the cabinet.

Another object of the invention is to provide means for producing such images so as to have the same data simultaneously on the front reading screen and on the rear reading screen.

Another object of the invention is to provide a means for simultaneously displaying data onto front and rear screens of a cabinet by use of a number of individual image-projecting systems inside of the cabinet arranged in such a manner that the projected fields are correlated.

Another object of the invention is to provide means to render such images visible in a variety of colors or combinations of colors on a colorless or colored background.

With these and incidental objects in view, the invention includes certain novel features of construction and combination of parts the essential elements of which are set forth in appended claims and a preferred form or embodiment of which is hereinafter described with reference to the drawings which accompany and form a part of this specification.

Of said drawings,

Fig. 1 is a part side elevation and part vertical section through a typical cash register or accounting machine, viewed from the right side, showing the novel indicator mechanism attached.

Fig. 2 is a schematic representation of the optical system used for projecting a single symbol.

Fig. 3 is a part elevation and part section of the arrangement of the symbol carriers, lenses, and mirrors for front and back projection, as looked at from the front, with the left end broken away.

Fig. 4 shows the screen on which the image is seen from the front of the machine.

Fig. 5 shows the screen on which the image is seen from the back of the machine.

Fig. 6 is a plan view of the right end of the aperture plate and the right end of the bottom of the lens trough.

General description

The drawings show the novel indicating mechanism as applied to a machine of the general type described in United States Patent 1,242,170, issued to Frederick L. Fuller, but it is adaptable to any machine having equivalent differentially settable members.

Only so much of the Fuller machine will be described as shows the mechanism for setting the symbol carriers in accordance with the transaction.

Referring to Fig. 1, which illustrates the mechanism in a typical amount bank, the main drive shaft 11 has secured thereto a double plate cam 12, which oscillates lever 14 through cam followers 13. Lever 14 is pivotally mounted on stud 15. Lever 14 makes one oscillation on each rotation of the main drive shaft 11 and in so doing oscillates a differential actuator driver 16 through link 17, first clockwise then counter-clockwise. The differential actuator driver 16 is pivotally mounted on shaft 18 as is a differential actuator 19. The differential actuator and the differential actuator driver are normally latched together so that the clockwise phase of the oscillatory movement of the differential actuator driver 16 will carry with it the differential actuator 19. This latch 20, fastened by a bell crank 24 and link 34 to the differential actuator 19, engages a step 21 on the driver. The latch 20 has a forwardly extending toe 22 adapted to engage one of notches 23 in the keybank frame when latch 20 is carried out of engagement with step 21 by a forward motion induced by a forward extending arm of the bell crank lever 24 striking the stem of a depressed key 25 or zero stop pawl 53. Bell crank lever 24 rocking counter-clockwise on its supporting pivotal stud 26 acts through pivotal stud 27, to pull the latch 20 to the forward or disengaged position. Therefore, by the disengagement of the latch from the driver 16, the differential actuator 19 is set according to the position of the key 25 that is depressed. The driver 16 completes its clockwise movement after the latch breaks and in the counter-clockwise phase of its oscillation it engages a stud 28 on the differential actuator 19 carrying the said actuator back to home, position. At the instant stud 28 is engaged by the driver, the step 21 on the driver 16 is in line with the latch 20 which is there reengaged with the driver, and the driver, joined to the differential actuator 19, returns to home position.

Extending from the differential actuator 19 is a stud 29 on which is pivotally mounted one end

of a beam 30. Each time the cam 12 rotates, a roller 31, on lever 14, contacts the underside of beam 30 and carries it against shaft 18. As this contact occurs when the differential actuator is in its extreme clockwise position, as determined by the key depressed, the position of stud 29 will differentially determine the position of the rear end of the beam 30 which, by pivotal stud 32, is joined to a link 33. Therefore, stud 32 and link 33 are positioned according to the key depressed.

All the foregoing description of the machine is given to show how the link 33 for each bank of keys is differentially positioned upon each oscillation of the differential mechanism of the machine.

The way in which the differential positioning of actuator 19 enters data into the totalizers 54 (Fig. 1) and the manner in which data withdrawn from the totalizers positions the differential actuators 19 is well known in the art and reference is again made to the Fuller patent for more detailed description of this particular machine, if desired. It is to be understood the disclosure here made is not to limit the application of the new mechanism herein disclosed as there are many well known methods of obtaining a differentially positioned member such as link 33.

As the link 33 shown in Fig. 1 represents one keybank, in this instance an amount keybank in the decimal system of numbers, it is well to explain at the outset that there may be a plurality of keybanks and that the keys in the keybanks may represent numerical amounts, classifications, symbols, words or indicia of any sort.

The symbols to be visually indicated are carried on wheels 45 (Figs. 1 and 3) mounted on a common axis 46. Each differential has associated within and is represented by two wheels, both of which are set through a single link member 33. As shown in Fig. 3 there are represented in this disclosure six differentials, as evidenced by twelve wheels 45. Some of the pairs bear numbers only, one pair bears numbers and punctuation, and still others bear words or letters.

Because, in use, a machine of the class described is viewed from both the front and rear, provision has been made, as is customary, for viewing the indication of a transaction from either the front or the rear of the machine. Because ordinarily there are a number of symbols appearing at once, some of which must be read consecutively, and because reading is generally done by sensing the symbols consecutively in one direction only, provision has been made for causing a converse order of the appearance of the images of the symbols on one side of the machine as compared with the opposite side, when conditions demand such an effect. In order to accomplish this result, two symbol carriers or wheels 45 are used in a set which together serve a differential, the paired carriers being connected and driven together. Various systems, such as yokes and nested tubes, have heretofore been used to connect paired symbol carriers so as to effect a converse order between driving and driven members, the problem being to keep the driving members from interfering with each other. A description will now be given of the driving means used in this invention to set the interspersed symbol wheels, although it is not to be deemed the only means for accomplishing the desired result.

Internal gear drive

Mounted on a stationary rod 35 (Fig. 1) fastened in the framework of the machine are securely mounted a number of bearing plates or discs 36, each having eleven small peripherally and equidistantly positioned holes 37 and one larger bearing hole 52. The holes 37 are alined to form clearance for square shafts 38 which extend through all the plates 36. To keep the plates 36 from rotating on shaft 35, a locking rod 39 is extended through a hole provided in each plate and the ends of the rod are fastened in the frame of the machine. A plate 36 is provided for each differential indicator setting link 33 and are spaced on rod 35 so as to be adjacent to their respective links 33. On each bearing plate is mounted a ring gear 50 having internal teeth 51 and external teeth 40. The links 33 associated with each plate 36 are pivotally attached to lugs 40 projecting from the gears 50 so that differential motion of links 33 will cause a differential angular motion of gears 50 on plates 36. Retaining plates 41 mounted on either side of bearing plates 36, and of slightly larger diameter than the bearing plates, hold the gears 50 in place on the bearing plates and also provide side enclosure for gears 42 placed in an enlarged bearing hole 52, one of which is provided in each bearing plate 36. Each link driven gear 50 has a companion gear mounted on another plate 36 similar to its own. These companion gears are therefore equal in number to the link driven gears 50. The large holes 52 in the bearing plates of companion gears 50 are in alinement and have their inner gears 42 connected by a square shaft 38 which is inserted in square holes in the gears 42 as shown. The link driven gears 50, therefore, drive their companion gears 50 the same distance in the same direction. This system of internal gearing is old having been disclosed in United States Letters Patent 1,693,279, issued to Walter J. Kreider to which reference is made for a more complete description.

Each gear 50 is geared to an intermediate pinion gear 43 (Figs. 1 and 3) which in turn is meshed with a pinion gear 44 hubbed to a symbol carrying wheel 45 (Fig. 1) mounted rotatably on shaft 46 secured in the framework. The pinions 43 are rotatably mounted on a common shaft 47 secured in the framework of the machine.

Symbol wheels

The internal gearing arrangement just described, in addition to allowing the symbol wheels associated with front reading to be arranged in converse order to those associated with rear reading, makes it possible to intersperse them at the same time, so that the spacing of the symbols may be adjusted to cover the width of the machine on both the front and rear screens, as will be described.

Sentences, words, numbers and symbols, are usually read in one direction only and contexts of words, sentences, letters, words and numbers must necessarily be read in a certain sequence to convey an idea. Thus, the digits of the number 9.87 if viewed from the rear, would appear in converse order from right to left, and each digit turned 180 degrees on a vertical axis, confusing the meaning. Therefore, the pairs of wheels bearing contextual matter, such as the example 9.87 given, are arranged so the wheels bearing the symbols to be projected forward have converse sequence to those adapted to be projected to the rear screen. The symbols are also oriented on their respective wheels as will be explained to obtain correct facing of the digits.

Each pair of wheels bearing similar data is controlled by a separate link 33 and a separate shaft 38, there being but half as many links 33 and half as many shafts 38 as there are symbol wheels. There are twelve symbol wheels 45 and six shafts 38 shown. The remainder of the holes 37 (Fig. 1), unused, indicates the expansibility of the mechanism.

Reference to Fig. 3 shows a typical arrangement of symbol wheels. The pairs pertaining to matter requiring contextual arrangement and being interspersed in converse sequence are indicated by the brackets 56, 57, 58, and 59. In this particular disclosure the contextual matter represents dollars and cents. Bracket 56 indicates the wheels bearing the units of cents, bracket 57 indicates wheels bearing the tens of cents, bracket 8 indicates the wheels bearing the units of dollars, and bracket 59 indicates the wheels bearing the tens of dollars.

The disclosure further shows two additional pairs of symbol wheels, one pair indicated by bracket 49 bearing symbols representing the clerk's identification and the other pair indicated by bracket 48 bearing words and symbols representing the type of transaction. As these symbols have no contextual relationship with one another or with the numerals, no arrangement is shown for a converse sequence. It makes no difference in meaning whether the indication shows "Cash E 9.987" or "9.87 E Cash," but it does make a difference whether the contextual matter is "78.9" rather than "0.87."

The disclosure so far has indicated how the wheels are arranged to provide the proper sequence for front and back contextual reading. The matter of the orientation of the symbols on the wheels to obtain erect images faced in the right direction will be discussed as the optical system is explained.

The symbol wheel 45 shown in Fig. 1 represents one bearing symbols to be projected to the rear screen 63, and the symbol wheel, shown diagrammatically in Fig. 2, represents one bearing symbols to be projected to the front screen 63. The wheels have 12 flattened surfaces on their periphery, each surface capable of supporting a symbol. The flattened surfaces of the wheels 45 are not tangential but inclined slightly, forming notched peripheries. The flattened surfaces on adjacent wheels are inclined in opposite directions for reasons that will be later brought to attention.

The projector cabinet

The projector cabinet 60 (Figs. 1, 4, and 5) consists of a top and side pieces which together with a bottom plate 67 (Figs. 1, 2, and 3) form a rectangular box. This projector cabinet is placed directly over the symbol carrying wheels 45.

The cabinet is divided into an upper and a lower chamber by a lens bearing partition 61 (Figs. 1 and 3) said partition effectively excluding transfer of light rays between the chambers except those passing through the lenses 70. The lenses 70 are mounted in the bottom of a trough 62 (Fig. 1), formed in the partition 61, so that the principal axis of each lens is vertical.

The upper chamber has rectangular openings in the front and rear sides, each fitted with a ground glass screen 63 (Figs. 1, 2, 4, and 5). Other materials, such as opal glass, may be substituted for the ground glass providing they are translucent, as the images are projected on the inside of the screens and are viewed on the outside of the screens. The upper chamber houses two mirrors 69 adapted to reflect rays, transmitted to them by the lenses 70, to the front and rear screens respectively. These mirrors may be of metal having a highly polished reflecting surface such as chromium.

Depending rfom the line of jointure of the mirrors 69 and 71 is a fin 72 (Figs. 1 and 3) extending into and across the full width of the lens trough. This fin is opaque and positioned so as to stop possible stray rays of light. The inside of the cabinet has a flat black finish to further absorb scattered rays of light.

Base plate

The base plate 67 (Figs. 1 and 6) of the cabinet is provided with a rectangular aperture 66 for each symbol wheel 45 of such dimensions and so positioned as to restrict the field of light rays admitted through each to the topmost flattened surface of its associated symbol wheel 45.

As has been said, the flattened surfaces of the symbol wheels 45 are inclined differently according to whether the symbols carried by it are to be projected to the front screen or the rear screen, the wheel 45 shown in Fig. 1 representing a symbol wheel serving the rear screen, and that shown in Fig. 2 representing a symbol wheel serving the front screen. It is obvious that the topmost surface of the symbol wheel 45 in Fig. 1 is to the front of a vertical plane through the axis of shaft 46, and that the topmost surface of the symbol wheel 45 in Fig. 2 is to the rear of such a vertical and rear projection, the apertures 66 will be stagplane. As the symbol wheels alternate as to front and rear projection, the apertures 66 will be staggered as shown in Fig. 6. As shown in Figs. 1 and 2 the notched formation of the wheels in connection with the base plate 67 further protects the field to be projected from stray light. The apertures 66 are of such size and coact with the sloping surface of the symbol wheels in such a manner that light reflected from adjacent wheels, or other surfaces than the topmost surface on the associated wheel of each, is excluded from access to the lens 70. The apertures art dimensioned according to the width and depth of the surfaces of the symbol wheel it serves.

The lenses

The lenses 70 (Figs. 1, 2, 3, and 6), used in this embodiment, are simple double convex lenses of short focal length, one lens accommodating the projected rays from two adjacent symbol wheels as shown in Fig. 3. One of the two symbol wheels associated with a given lens carries symbols for the front screen and the other carries symbols for the rear screen. The adjacent wheels served by one lens need have no particular relation to one another with respect to the symbols carried thereon. One lens is used for two wheels for economy of space, and for the reason that a larger diameter lens is preferable for better illumination of the image.

Light source

A cylindrical electric lamp 64 (Fig. 1) is mounted lengthwise in each channel formed by the lens trough and the adjacent front and rear sides of the cabinet. The lamps are of a type giving a uniform illumination to the apertures. The color of the light may be of any suitable tint which upon reflection from the symbols is reproduced on the screen in its original tint. The original tint may be modified by color ab-

sorbing transparencies interposed in the projected rays or by a mixture on the screens 63 with another projected color or by a coloration of the screen itself which would modify the color transmitted thereby.

Behind each lamp is a reflector 65 (Fig. 1), of curved section, adapted to concentrate the illumination on the row of staggered apertures 66 in a uniform manner. As the inside of the lower chamber is light absorbing, no reflected rays may enter the lens except by going down through the aperture 67 and being reflected back by the symbols. It will be understood that the type of lamp or lamps is not material so long as sufficient illumination is obtained.

The symbols

The symbols carried by the wheels 45 are formed of metal having a highly polished surface, chromium in this instance. The surfaces to which the symbols are attached are black and of light absorbing finish so as to give a high degree of contrast between the symbols and the background.

The lens are of such construction that the images thereof are inverted as the rays pass upwardly through them. Because the central axis of each lens lies in the vertical plane through the axis of shaft 46, the light emanating from the aperture 66 shown in Fig. 1 is projected by the lens 70 to the rear mirror 71. The light emanating from the aperture 66 shown in Fig. 2 is projected by the lens 70 to the front mirror. The apertures 66 (Figs. 1–3) restrict the use of each of the lenses to two light beams, the direction of their path through the lens determining which mirror 69 they will strike.

By reference to Fig. 3 it is seen that the central axis of each lens lies in the plane of separation of the two symbol wheels it serves. This relation causes the light emanating from the aperture over the left wheel 45 of a pair, to be projected toward the right and the light from the aperture 66 over the right wheel to be projected toward the left. This condition is incidental in the present disclosure but explains the path of the rays illustrated in Fig. 3. As the projected images of the symbols strike their respective mirrors 69 they are rotated about a left to right horizontal axis until directed toward the associated screen 63, the sense of the rotation as looked at in Fig. 1 is counter-clockwise for reflections from the rear mirror and clockwise for reflections from the front mirror. Examination of the symbols carried on the wheels 45 in Fig. 3 will show that each right wheel of a set served by one lens, carries symbols oriented for projection to the front, and each left wheel carries symbols oriented for projection to the rear.

In the sample wheels 45 used in the drawings it will be noted that the two wheels at the right in Fig. 3 bear complete words; that the next two wheels to the left bear single letters, that the next two wheels to the left bear numbers; and that the next two wheels bear numbers and punctuation marks. The wheels bearing punctuation marks for front projection is the tens of cents wheel, whereas the wheels bearing the punctuation marks for rear projection is the units of dollars wheel, this arrangement equalizing the spacing of the projected images.

Screens

The screens upon which the images, formed by the lens and reflected by the mirrors, are projected receive the projection from the inside of the cabinet and are viewed from the outside of the cabinet. Therefore the screen must be of such translucency as not to destroy the contours of the image. Ground glass is suitable for such a screen and, if colorless, will transmit the image in its true colors. Other denser screens such as colored or plain opal glass may be used with resultant modifications of color of the image or the background against which it is viewed.

The spacing of and the size of the images on the screen is governed jointly by the spacing of the wheels 45, the size of the symbols, the focal length of the lens, and the distance the rays of the image must travel. These factors being matters of adjustment, having no bearing on the invention itself, are not discussed.

While this invention is shown as applied to a cash register and shows but two apertures to one lens, it is obviously restricted to neither and may be applied to any machine having differentially movable members, or to a machine where it is desired to display images in more than two directions by using more than two mirrors, or by increasing the utility of a single lens by admitting light to it from more than two apertures.

The optical system shown being made up of units to form a reading line on the screen consisting of composite correlated images, it is obvious that the units may be increased to form a longer reading line without varying the distance between the symbols and the screen.

While the form of mechanism herein shown and described is admirably adapted to fulfill the objects primarily stated, it is to be understood that it is not intended to confine the invention to the one form or embodiment herein disclosed, for it is susceptible of embodiment in various forms all coming within the scope of the claims which follow.

What is claimed is:

1. In a machine of the class described having a totalizer and a differentially settable member by which data may be entered into or withdrawn from the totalizer, the combination of two reels having a fixed angular relation to each other rotatably mounted on a common axis and bearing light reflecting symbols so positioned that symbols having the same contours are mounted at the same peripheral position on their respective reels but turned 180 degrees from each other on an axis of rotation perpendicular to the surface on which the symbols rest; means to position the reels in accordance with the data entered into or withdrawn from the totalizer; a source of light to illuminate those portions of the reels presenting the data entered into or withdrawn from the totalizer; an image forming lens positioned to gather reflected light rays from the reels; a shield preventing light from the reels being admitted to the lens except through two apertures each of which admits the rays coming from one of the pair of corresponding symbols displaying the pertinent data; two mirrors reflecting the light transmitted and refracted by the lens one of which reflects the rays emanating from one aperture and the other reflecting in the opposite direction the rays emanating from the other aperture; and a translucent screen for each mirror upon which the refracted and reflected rays form an image so that the same data may simultaneously be seen in normal form on both screens.

2. In a machine of the class described having

totalizers, a plurality of differentially settable members by which data may be entered into or withdrawn from the totalizers, a pair of symbol carrying reels for each differentially settable member, a common axis on which said pairs of reels are rotatably mounted in adjacent or interspersed manner, and means to set the pairs of reels in accordance with the data entered into or withdrawn from the totalizers by the associated differentially settable member, the combination of light reflecting symbols mounted on the periphery of each reel representing the data that may be entered into or withdrawn from the machine, said symbols on a pair of reels being the same except rotated 180 degrees from each other on an axis of rotation perpendicular to the surface on which the symbol rests; a means to illuminate the portion of the reels bearing the pertinent data; a lens for each two adjacent reels to transmit and refract the light reflected from the illuminated symbols so as to make thereof an image forming bundle of rays; a shield preventing light from the reels being admitted to the lenses except through apertures of which there are two for each lens each of which apertures admit light from the pertinent part of but a single reel in such a manner that the rays from symbols oriented similarly take the same direction through their respective lenses; a front and back reflecting means whereby the rays from symbols oriented in one direction are reflected to the front of the machine and the rays from symbols oriented in the other direction are reflected simultaneously to the rear of the machine; and a translucent screen for each the front and the rear directed rays upon which said rays form images of the symbols in an erect and contextual manner the same data being simultaneously shown on both screens.

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CERTIFICATE OF CORRECTION.

Patent No. 2,221,063. November 12, 1940.

WALTER DORWIN TEAGUE, ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, first column, line 38, for the word "within" read --with it--; page 3, first column, line 31, for "9.987" read --9.87--; line 33, for "0.87" read --9.87--; and second column, line 7, for "rfom" read --from--; line 34, strike out the words "and rear projection, the apertures 66 will be stag-"; line 46, for "art" read --are--; page 4, first column, line 12, for "aperture" read --apertures--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 17th day of December, A. D. 1940.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)

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